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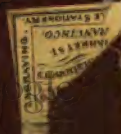
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Received Oct. 1870.



LOSS OF THE MISSIONARY BARK "JOHN WILLIAMS."
It is with deep regret that we have to announce the total wreck of this truly splendid bark, at the South Sea Islands in March last. It would appear that the intelligence was first received in Sydney, but was at first doubted there, as will be seen by the following extract from the *Herald* of the 8th inst.:

1867
It is to be feared that the report brought by the schooner *Ida*, respecting the wreck of this beautiful ship is but too true, although the particulars are very meagre. Capt. Roban, of the *Ida*, says that while at Kautava a missionary, whose name he forgets, reported to him that the *John Williams* had been totally wrecked on one of the islands forming the Navigators' Group, and that the wreck had been sold for \$500, and that it was supposed to have occurred during the violent hurricane that swept the islands on the 9th of March, causing great loss at the Tonga and Fiji groups. Capt. Roban not having heard this report either at Tonga, Vavou, or Ovalau, expressed an opinion that the story of the wreck might have arisen from the fact that the bark *John Williams* having some time since been on a reef and subsequently repaired in Sydney; but the missionary was positive that the unfortunate affair took place on the bark's last passage from Sydney to the islands. She was commanded by Capt. Williams, a gentleman of considerable nautical knowledge, particularly among the South Sea Islands, a series of years having made him intimately acquainted with the intricate navigation of the various groups, and we feel assured that his large circle of friends in these colonies will feel deep sympathy for him should the report prove but too true.

The report has now been confirmed by Capt. Young, of the *Neva*, which arrived here on Saturday last from Savage Island. Capt. Young says that he saw the remains of the wreck on the reef near the island at the beginning of this month. She drifted in to the reef in a calm, and not in a hurricane, as supposed. All the masts had gone out of the vessel, but the hull was standing quite perfect, with the exception of one hole in her bottom. The wreck had been purchased for \$500 at Samoa, by the celebrated Capt. Hayes, of the brig *Bona*. The loss of this fine new bark will be a severe blow to the Missionary Societies.—*Australian paper*.

THE PITCAIRNERS ON NORFOLK ISLAND.—The *Honolulu Friend*, for July, has a letter from one of the old Pitcairn Islanders, named John Buffett, who is not himself a descendant, but who married a daughter of one of the original mutineers of the ship *Bounty*. It will be recollected by our readers that all the inhabitants (about 200) of Pitcairn's Island were removed by the British Government to Norfolk Island, after that island was abandoned as a penal settlement. Some of them, however, were so dissatisfied with the change that they chartered a schooner and returned to their old home on Pitcairn's Island, where they are now living.

Mr. Buffett utterly denies the charges which have been put in circulation by the *Sydney Morning Herald*, as to the lapse of these people into the degradation of heathenism in their new home. He writes, under date of February 7th:

We are now getting on very well. We obtained about 240 barrels of humpback oil this year, and last year about 350 barrels. We export cheese and butter, and should get on very well if they would leave us alone; but they want to civilize us, and we find it a great deal better to be semi-civilized, as we do not find so much roguery in the latter as in the former state. When we came here we were officially informed that the land, with the exception of 700 acres, as glebe land, was ours, and the sheep and cattle also; but we soon found to the contrary, for the sheep were taken from us, and all the cattle we had not marked, and we now understand that 1,000 acres of the best land on the island is sold, or to be sold to the Bishop of Melanesia, and we have nothing to say in the matter. Some time ago we advocated that the Bishop should have a branch school on the island, we supposing that at the most he would not want more than 200 acres, but judge of our surprise when we heard of his having a ninth part of the island.

Terrible Hurricane at the South Sea Islands —Wreck of Several Vessels and Great Destruction of Property.

A letter dated Rarotonga, April 5th, contains the following particulars of a terrible hurricane at the South Sea Islands:

1867
On March 26, 1866, we had a severe hurricane in Rarotonga, and as there is a fixed idea in the mind of our people that this occurs only once in twenty years, we thought ourselves safe for a long time to come; but on Thursday morning, March 21st, my people came inquiring whether we should have a hurricane, as on Wednesday night the sea had been much agitated, so that some canoes, out fishing, were almost swamped. On Thursday the sea began to rise considerably over its usual level, the wind strong, but steady, from east by south; barometer 29.80, and falling. Thursday night sea still rising as well as wind, but steady; barometer 29.64. Friday morning sea awful, wind stronger and somewhat gusty; barometer 29.20, and falling. At 3 o'clock had the alarm bell rung, to prepare for the worst. Friday night was fearful; sea still rising, wind in gusts with heavy rain, but one, and only one, vivid flash of lightning and crash of thunder; the wind then veered to east, but after three hours went back again to east by south, stronger than before. Saturday morning secured all doors and windows and roofs of houses; barometer 28.95. Received into our house a foreign family with nine children, whose house was swept through by the sea. The chief Waka asked permission to occupy our printing office, and all our students' houses were crammed with people and things from the village, over which the sea was breaking. Several large stone buildings, the market house, Judgment Hall and Lower Mission Store were swept away. Saturday was an awful day. All our people were engaged in saving what they could of their property from the still rising waves; barometer 28.80; in the afternoon, 28.78; evening, 28.75. The night was truly awful. At 9 o'clock the barometer anemoid appeared as if under the influence of magnetism, the hand moving constantly and regularly between 28.74 and 28.76, till 10 o'clock, when it stopped at 76 and began to show symptoms of rising. At 12 o'clock began to rise to 28.77, the wind worse than ever. Sunday morning, at 8 o'clock, barometer 28.90, wind entirely abated, and appeared to be flying about every where. At 7 o'clock wind blew as violent as ever from west by north, but the sea had greatly abated on Sunday morning early. The barometer now rose, but very slowly, being on Monday morning only 29.05. It blew very strong all Monday morning till Tuesday afternoon, when the barometer stood 29.40. The length of this cyclone is most extraordinary, as also the fearful sea which receded and accompanied the first half—rising higher and higher at the centre, so it could not have been a common storm wave. Our school-house is the only house near the beach which stood, but it had all the internal fittings destroyed and the sand and coral thrown up three feet high in it. All the aspects of Auarua and the harbor is changed, and all the buildings have been more or less injured. Of the 50,000 lb 60,000 pounds of coffee we expected, about half is destroyed; and of the oranges, more than three-quarters. The loss to the island cannot be less than \$20,000, and scarcity of food and illness will be the consequence of it. I do not apprehend a famine, as the sweet potatoes and taro are but little injured.

From the Fijis we learn that a violent hurricane passed through the Tonga and Fiji groups on the 9th of March, causing great loss, particularly among the shipping. The schooner yacht *Sz. Kuda*, belonging to King George, was stranded at Tonga, and some 16 or five craft either completely wrecked or seriously damaged. The schooner *Shawrock* of Lyttelton, N. Zealand, sailed from Tonga on the 20th of March, bound Ovalau and Kautava, and has not since been heard of at either port up to the 28th of April, and it is conjectured that she must have foundered, as she was leaning badly when she left Tonga, or else she has gone down one of the numerous reefs that abound in that locality. The accounts from other islands are equally as bad and distressing.

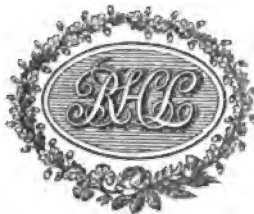
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A DIRECTORY
Pacific
FOR THE
NAVIGATION
91.
OF THE
PACIFIC OCEAN;

WITH DESCRIPTIONS OF ITS
COASTS, ISLANDS, ETC.,
FROM THE
STRAIT OF MAGALHAENS TO THE ARCTIC SEA,
AND THOSE OF
ASIA AND AUSTRALIA ;
ITS WINDS, CURRENTS, AND OTHER PHENOMENA.

IN TWO PARTS.

BY ALEXANDER G. FINDLAY,
1870 FELLOW OF THE ROYAL GEOGRAPHICAL SOCIETY.

PART II.
THE ISLANDS, ETC., OF THE PACIFIC OCEAN.



LONDON:
PRINTED FOR R. H. LAURIE,
CHART-SELLER TO THE ADMIRALTY, THE HON. CORPORATION OF TRINITY-HOUSE, ETC.,
No. 53, FLEET STREET.

1851.

I have been thinking of you very much lately, and
 wondering how you are getting on. I hope you are
 well and happy. I have been very busy lately, but
 I have managed to find some time to write to you.

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 wondering how you are getting on. I hope you are
 well and happy. I have been very busy lately, but
 I have managed to find some time to write to you.

Notes at Stationers' Hall.

London A. & W. Hillman, Printers, 14, Bartholomew Close.

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INTRODUCTION.

THE present volume, forming the second part of the Nautical Description of the Pacific, differs in its character from the first chiefly in being confined to accounts of the islands and archipelagoes which are scattered over the space between the Old and New Worlds.

In the Introduction to the first part we have given a brief enumeration of the principal authorities upon which the authenticity of our book rests. It is unnecessary to allude to this further here, the more especially as the subsequent pages will show that the original works are carefully quoted for each article. And the reader will be able to judge as to the degree of dependence, necessarily very various, which each account may claim.

But there is one broad distinction, generally, in the geographical portion of the two volumes. In the former, great extent of coasts, as the whole of South America and a large portion of the Northern Continent, have been well surveyed and amply described, so that there is little room for scientific improvement by isolated observations of the commander with limited means. In the present, on the other hand, there is ample scope for the observations and discovery of every one. Although many portions of the groups, and in some cases entire archipelagoes, are tolerably surveyed and described, still most of the isolated spots of land and detached shoals require to be much better known; and very great extent of ocean must be more closely examined before the ship-master can traverse the Pacific Ocean with confidence—either that the known dangers are correctly placed, or that innumerable lurking but undiscovered dangers may not be encountered. The attention of every one into whose power it may fall to give information to the world for the benefit and safety of the mariner, is hereby most earnestly recommended.

One important part of Pacific hydrography is the relative value of the positions assigned to the various points as detailed in the ensuing tables. Now, there is every evidence that much remains to be done in this, before the same connected accuracy will be found that exists in the geography of other portions of the globe. Many of the regions of the great ocean are now delineated from the observations of their first discoverers, without any of the amendment in respect of situation which repeated observation necessarily produces. This appears more particularly to be the case in the western portion of the Pacific, where there is abundant room for improvement.

The work itself will give all the details respecting our present knowledge of each portion of the Pacific Islands, and the following Table of Positions gives the authorities upon which each item of the latitudes and longitudes rests. But it will be seen that from its very nature it can be by no means perfect. And even with the materials we have at present at command, there is little doubt but that some improvement might be effected by verifying and adjusting the varied estimates formed by different navigators. In other parts of the world much has been done in this field by Lieutenant Raper. Here the principal labourer, indeed it might be said the only one hitherto, is the great hydrographer Admiral Krusenstern. His invaluable work, as has been already stated in the introductory portion of the previous volume, is the labour of many years in reconciling the discordant materials which have composed the sum of the geography of the Pacific. It may be stated that the determinations of Admiral Krusenstern have been generally followed here, except when later observations entitled to more confidence have superseded the former. This will be found to be the case in very numerous instances.

This brings us to another point which has been alluded to in the previous volume, but for the sake of convenience we will repeat the substance of what is there stated, as the remarks are still more applicable to the tables which follow this, than to the longitudes of the points of the continental boundaries of the Pacific.

The latitude of a place is found with much greater accuracy and simplicity than its longitude, and therefore but little need be said on that point; but the longitude of places whose meridians are so wide apart as in the Pacific, the accurate determination of longitude becomes a complex and difficult question. We need not dilate now on the uncertainty of the longitude determined by astronomical observations alone, except in the long series which have been made in the fixed or temporary observatories established in a few places. Even they have been found to be open to doubt to the extent of several minutes, and in perhaps only one instance—that of Paramatta, in New South Wales—is the longitude accurately and unimpegnably ascertained.

But there is one mode, more especially insisted on by Lieutenant Raper, to whom so much is owing, by which it is almost in the power of any one possessing a good chronometer to verify or improve his predecessors' determinations. This is to connect any new or less known point with one *better* ascertained, whether the latter be absolutely correct or not. "The question would thus be narrowed into the determination of *chronometric differences* alone, until a favourable opportunity occurred for the definitive determination of a fundamental position." Any improvement which is made in this primary point must, therefore, be extended to all those dependent on it. With this view Lieutenant Raper has selected twenty points in various parts of the globe, to serve as secondary meridians for the districts in their vicinity. Five of these refer to the Pacific. And as uniformity is in every way desirable, we have taken Lieutenant Raper's determinations as the groundwork; and, in addition to those he has chosen, several other points have been proposed in the first volume for the same purpose in the Pacific, and are as follow:—

	In time.	In arc.
	H. M. S.	
STRAIT OF MAGALHAENS: Port Famine Observatory	4 43 51·7	70 57 55 W. (FitzRoy.)
VALPARAISO: Fort San Antonio	4 46 46	71 41 30 W. (FitzRoy.)
CALLAO: Arsenal flagstaff	5 8 54	77 13 30 W. (FitzRoy.)
PANAMA: N.E. Bastion	5 18 4·8	79 31 12 W. (Belcher.)
SAN FRANCISCO: Yerba Buena Cove	8 9 36	122 24 0 W. (Beechey.)
SITKA: Arsenal Light	9 1 8·7	135 17 10 W.
AWATSKA BAY: Petropaulovski Church	11 14 54	168 43 30 E. (Beechey.)
SANDWICH ISLANDS: Honolulu Fort	10 31 40	157 55 0 W. (Raper.)
LADRONE ISLANDS: Guam, Umata Bay Church	9 38 36	144 39 0 E. (D'Urville.)
NEW GUINEA: Port Doreï	8 55 59·47	133 59 52 E. (D'Urville.)
FEEJEE ISLANDS: Ovalau Island, Levuka Harbour, Observatory Point	11 55 30·7	178 52 41 E. (Wilkes.)
TAHITI: Point Venus, S.E. extreme	9 7 56·7	149 29 1 W. (Beechey.)
NEW ZEALAND: Bay of Islands, Paheha Mission	11 36 28	174 7 0 E. (La Place, &c.)
SYDNEY: Fort Macquarie	10 4 56	151 14 0 E.

In the future determination of longitude by chronometer, it is hoped that the meridian and particulars of the original station may be stated, and thus remove much of the vagueness which too often attends the records of what may be otherwise excellent determinations.

TABLE

OF

POSITIONS, TIDES, MAGNETIC VARIATIONS, &c.

PART II.

XX. — SOUTH SHETLAND AND ANTARCTIC LANDS.	Lat. South.	Lon. West.	Authority.	Var. East.	H. W.	Range.	Page.
				° /	N. M.	FT.	
LAURIE ISLAND; Cape Dundas .	60 54 0	44 57 0	D'Urville.				658
Saddle Island; W. peak, 1,643 ft.	60 43 0	45 10 0	Weddell.				658
Coronation Island; E. summit .	60 46 0	45 53 0	"				658
" " Pt. Conception	60 32 30	45 57 0	D'Urville.				658
Inaccessible Island; middle .	60 42 0	47 13 0	"				—
Cornwallis Island .	61 4 0	54 28 0	"				—
Elephant Island; E. summit .	61 6 0	54 45 0	"				—
" " S. peak .	61 15 0	54 51 26	"				—
O'Brien Island .	61 32 0	55 53 0	"				—
Bridgeman Island .	62 4 0	56 40 0	Weddell.				662
King George Island; C. Melville	62 2 0	57 30 0	"				—
Livingston Island; Cape Sheriff .	62 28 0	60 28 0	"				662
Deception I.; Pt. Foster, Mt. Pond	62 56 36	60 35 0	Foster.				660
Smith Island; Mount Foster .	63 2 0	62 47 0	"				657
William Rock .	63 17 0	63 0 0	"				—
Hoseason Island; Cape Possession	63 45 0	61 50 0	"				657
Mount William .	64 45 0	63 51 0	Biscoe.				657
Biscoe's Range; Pitt Island .	65 20 0	65 40 0	"				656
Adelaide Island; centre .	67 15 0	68 15 0	"				656
L. Philippe Land; C. Roquemare	63 30 20	58 29 16	D'Urville.				663
Astrolabe Island .	63 16 0	58 18 26	"				663
Mount D'Urville .	63 28 45	57 41 0	"				663
Dumoulin Islands; largest .	63 26 50	59 16 0	"				663
Joinville Island; Cape Purvis .	63 39 0	55 48 0	"				663
Cape Seymour .	64 13 0	56 32 0	Sir James Ross.				—
Mount Haddington .	64 12 0	58 2 0	"				—
Peter I. Island; 4,000 feet .	68 57 0	90 46 0	Bellinghshausen.	36 6			663
Alexander I. Island; N. point .	68 51 0	73 9 46	"				663
Balleney Islands .	66 44 0	163 11 0	Sir James Ross.				667
VICTORIA LAND; Mount Sabine,							
10,000 feet .	71 42 0	169 55 0	"				668
" " Cape Adair .	71 18 0	170 45 0	"				669
" " Mt. Dalmeny .	71 5 0	167 8 0	"	44 0			669
" " Possession Id. .	71 56 0	171 7 0	"				670
" " Franklin Id. .	78 6 0	168 12 0	"				672
" " Mount Erebus .	77 33 0	166 58 0	"				672
" " S. Magn. Pole .	76 0 0	145 20 0	"				672
ANTARCTIC LANDS; Disappoint-							
ment Bay .	67 4 30	147 30 0	Wilkes.				673
" Piner's Bay .	66 45 0	140 2 30	"				673
" Adelie Land; C. Robert	66 21 15	133 15 30	D'Urville.				674
" " C. Pepin .	66 29 15	134 7 0	"				674
" " Pt. Geology .	66 34 35	135 39 30	"				674
" " C. Discovery .	66 35 48	136 29 0	"				674
" " C. Jules .	66 37 0	136 5 0	"				674
" Clarie Coast .	64 31 0	128 23 30	"				675
" Sabine Land .	65 20 0	121 8 0	Balleney.	West.			675
" Knox's High Land .	66 0 0	106 18 42	Wilkes.	57 5			675

TABLE OF POSITIONS,

	Lat. South.	Lon. East.	Authority.	Var. East	H. W.	Range.	Page.
					H. M.	FT.	
Nimrod Islands(?)	56° 30' 0"	158° 30' 0"	Elbech, 1828.	0			678
Emerald Island(?)	57 15 0	163 0 0	Nockells, 1821.				678
Macquarie Island; S. point	54 44 0	159 49 0	Wilkes.				678
Bishop and his Clerk	55 15 0	159 0 0	Bellingshausen.				679
Judge and his Clerk	54 22 0	158 46 0	"				679
Campbell Id.; Perseverance Harb.	52 33 26	169 8 41	Sir James Ross.	17 54	12 0	43	680
AUCKLAND ISLES; Enderby Id.; }	50 32 30	166 12 34	"	17 40	12 0	3	687
" " Sarah Harb. }							
" " " " E. pt.	50 30 0	166 19 0	"				691
" " " " Disappointment Id.	50 39 48	166 23 38	D'Urville.				691
" " " " Cape Bennet	50 51 0	166 15 0	"				691
" " " " Mt. Eden, 1,325 ft.	50 35 0	166 10 0	Sir James Ross.				682
" " " " Bristow Rock	50 19 0	166 13 0	Bristow.				691
" " " " S. Cape	50 56 38	166 12 4	D'Urville.				691
Antipodes Island	48 32 0	179 40 0	Krusenstern.				691
Bounty Island	47 55 0	178 26 0	Biscoe; Martyn.				691
CHATHAM ISLANDS.							
Ware Kauri, or Chatham Island;							
Point Allison	43 46 30	177 7 0	Chart by Fournier,				692
Wangaroa Bay	43 49 0	176 53 0	Dieffenbach, &c.				699
Waitangi Harbour; village . .	43 57 40	176 44 0	"			6	698
Point Traffic	44 1 0	176 52 0	"				—
Waka-Kaiwa Hills	44 5 40	176 48 30	"				700
Cape Evêque or Beaufort . . .	44 7 0	176 49 0	"				700
Cape Oinga	44 4 0	176 33 30	"				700
Waikeri Port	43 46 0	176 18 0	"				700
Wakuru Island; W. point . . .	43 41 0	176 14 0	"				695
Cape Young	43 41 0	176 47 10	"				695
Rangitutahi, or Two Sisters' Islets	43 33 0	177 0 0	"				701
Western Reef; W. point . . .	43 55 0	177 13 0	"				701
Sentry, or Solitaire Reef . . .	44 12 0	176 47 0	"				701
Rangi-haute or Pitt Island; S. pt.	44 15 0	176 50 0	"				701
Pyramid	44 20 0	176 29 0	"				701
Star Quay Reef	44 12 0	176 8 0	"				701
Bertier Rock	43 54 0	176 12 0	"				701
XXI.—NEW ZEALAND.							
Three Kings, or Manawa Tawi;							
principal	34 13 0	172 10 0	(FitzRoy.)				706
Cape Maria Van Diemen	34 27 0	172 36 0	D'Urville.				707
Cape Otou, or North Cape . . .	31 24 0	173 1 0	"				708
Parenga-renga Harbour	35 35 0	172 57 0	Charts.			10	708
Mount Camel, or Ohoura	34 49 0	173 0 0	"				709
C. Kari-Kari, or Knuckle Point .	34 47 0	173 28 0	"				709
Doubtless, or Lauriston Bay;							
Refuge Cove	34 53 0	173 22 0	"	12 40			710
" " " " Pt. Surville	35 6 50	173 35 0	Hayes.			7	710
Mango-nui Harbour	34 55 0	173 55 0	Charts.				710
Wangaroa Bay, Peach Island . .	35 1 30	173 44 0	Woore, &c.	12 0	8 15	7	711
Didi-Houa Islands	34 56 0	173 50 0	Charts; Raper.				711
Cavalles, or Motou-Kawa Islands	34 58 0	173 59 0	"				712
Bay of Islands; Cape Wiwia,							
Tiki-Tiki, or Nine-pin	35 9 20	174 10 0	Duperrey.				712
" " " " Pahia	35 16 30	174 6 20	La Place, &c.				713
" " " " Kororariki; Kairaro Islet	35 15 2	174 9 2	"	11 30	0 20	6½	713
Cape Rakaou, or Bret	35 10 0	174 22 0	Cook.				717
Poor Knights, or Tawiti Rahi; N.							
point	35 28 0	174 25 0	"				717
Hauraki or Shouraka Gulf; Cape							
Tewara, or Bream Head	35 50 30	174 35 0	D'Urville.	13 0			718
Wangari Harbour; Lort Point . .	35 51 9	174 32 10	Stokes, 1849.	14 0	7 0	5 to 9	718
Morotiri, or Hen and Chick., E. pt.	35 54 0	174 56 20	D'Urville.				718
Tiri-tiri Matanghi Island; summ.	35 33 30	174 54 0	"				719
Rangi-toto Island; 920 feet . .	35 45 30	174 52 0	"				719
Auckland Harbour; Depot Point	36 50 5	174 50 30	Stokes.	14 0	7 5	7 to 13	721

	Lat. South.	Lon. East.	Authority.	Var. East.	H. W.	Range.	Page.
	° ' "	° ' "		° ' "	H. M.	FT.	
Wai Hekeh Island; N.E. point .	36 46 0	175 13 20	D'Urville.				724
Waihae, or Coromandel Harbour .	36 45 40	175 28 0	Downie.				724
Cape Colville, or Moe Hao .	36 28 0	175 20 0	D'Urville.				724
Otea or Great Barrier Island; Aiguilles Point .	36 1 15	175 23 40	"				725
Shoutourou or Lit. Barrier I.; sum.	36 11 15	175 4 0	"				726
Cavir Island .	36 26 0	175 42 0	"				727
Mercury Bay, or Witi Anga Island	36 36 0	175 43 0	Cook.				727
Aldermen Rocks .	36 57 0	176 4 0	"				727
Tobous or the Mayor Island .	37 17 0	176 15 0	"				728
Astrolabe Reef .	37 24 0	176 17 0	D'Urville.				728
Tauranga Harbour .	37 37 0	176 11 0	Cook.				728
High Island .	37 34 0	176 26 0	"				729
Mount Edgecumbe .	38 0 0	177 2 0	"				729
Motou-Hora Island .	37 51 0	177 6 0	"				729
Pubia-i-Wakadi, White, or Sulphur Island .	37 33 0	177 14 0	"				729
Cape Runaway, or Te Kahu .	37 33 0	178 8 0	"				730
East Cape, or Wai Apou .	37 42 0	178 39 24	D'Urville.				730
Mount Ikou Rangui .	37 55 0	178 16 0	"				730
Hana-Hana, or Tolaga Bay .	38 22 0	178 26 0	"				730
Cape Gable .	38 31 0	178 26 0	Cook.				731
Tsone Roa, or Poverty Bay; Young Nick's Head .	38 42 0	178 1 0	"				731
Table Cape .	39 7 0	178 7 0	D'Urville.				731
Tea Houa, or Portland Island .	39 23 0	177 56 0	"				732
Cape Mata-Mawi, or Kidnapper's Point .	39 41 0	177 9 0	"				732
Motu Okura, or Bare Islet .	39 51 0	177 5 0	Charts.				732
Cape Topolo-Polo, or Turnagain .	40 32 0	176 43 0	"				733
Castle Point .	40 57 0	176 20 0	"				733
Point Tehouka-Kore, or Flat Point	41 9 0	176 11 0	"				733
Cape Kawa-Kawa, or Palliser .	41 37 0	175 21 0	"				733
Port Nicholson; Wellington, Pen- carrow Head .	41 17 12	174 50 45	Chaffers.				738
Cape Terawiti, or Poli-wero .	41 17 30	174 40 0	Charts.				740
Mana or Table Island; N. point .	41 6 0	174 49 0	"				740
Porirua Harbour; entrance .	41 7 0	174 54 30	"				741
Kapiti, or Entry Island; S.W. pt.	40 51 0	174 55 0	"				741
Waikanaha .	40 48 0	175 8 0	"				742
Manawatu River; Pa Papangaio	40 28 0	175 8 11	Smith.			6 to 9	743
Wanganui River; mouth .	39 55 44	175 5 0	Diefenbach.				744
Mount Egmont, or Pouke-e-au- papa, 8,839 feet .	39 18 0	174 10 30	Stokes.				745
Cape Egmont, or Pieter Boreel C.	39 20 0	173 49 30	"				746
New Plymouth; flagstaff at land. pl.	39 3 35	174 5 31	Evans.		9 30	12	747
River Mokau .	38 32 0	174 46 0	Chart.				750
Albatross Point .	38 4 0	174 52 0	Cook.				750
Waingarua Harbour; Woody or S. Head .	37 40 0	174 58 0	"		10 0	10	751
Wai-kato Harbour .	37 20 0	174 47 0	"				753
Manukau Harbour; Nine Pin Rock	37 2 57	174 29 4	G. O. Ormsby.	13 0	9 30		755
Kaipara Harbour; N. Head .	36 29 0	174 8 0	M'Donnell.				755
Hokianga, or Shouki-Anga; S.E. pt.	35 32 0	173 29 0	P. P. King.	12 30	9 30	10	737
Wangape, or False Hokianga .	35 14 0	173 15 0	Charts.				759
Cape Farewell .	40 28 0	172 48 0	D'Urville.				760
Entry Bank; E. extreme .	40 37 0	173 10 0	"				760
Massacre Bay; Separation Point	40 45 30	173 5 30	"				761
Victoria Haven; Tata Island .	40 46 0	172 59 0	Charts.				761
Torrent Bay; Jetty Point .	40 56 50	173 5 30	D'Urville.	14 0			761
Adèle Island; Point Jules .	40 59 0	173 5 45	"				762
Astrolabe Road; Observ. .	40 58 22	173 5 0	"	14 0	8 0	12	762
Nelson; magazine on boulder bank	41 15 30	173 16 5	Stokes, 1849.	15 5	8 50	6 to 13	763
Pepin Island; N. point .	41 9 30	173 28 0	D'Urville.				764
Croisilles Harbour; Pt. L'Ardet .	41 4 40	173 40 0	"				764
Current Basin; Hole in the Rk. Pt.	40 58 0	173 50 0	"				764

TABLE OF POSITIONS,

	Lat. South.	Lon. East.	Authority.	Var. East.	H. W.	Range.	Page.
Passé des Françaises	40° 55' 30"	173° 51' 45"	D'Urville.	14° 0'	H. M.	FT.	765
Rangitoto or D'Urville Island	40 44 0	173 57 0	Woore.	14 30	8 0	12	765
Port Hardy; Nelson's Monument } Stephens' Island	40 40 30	174 2 40	Charts.				765
Admiralty Bay; Pelorus Sd. entr.	40 58 30	174 1 0	"				766
Port Gore; Hart Point	41 1 40	174 8 0	Woore.				766
Queen Charlotte Sound; entrance	41 0 0	175 25 0	Cook.				767
" " " Ship Cove	41 6 0	174 18 0	"	13 5	9 = 10	7 to 8	767
Point Jackson	40 56 30	174 23 30	Charts.	(1770)			768
Motuara Island; N. point	41 4 0	174 21 30	"				769
Arapawa Island; Cape Koumaru	41 5 0	174 27 0	"				770
The Brothers Islands; N. islet	41 6 0	174 31 0	"				770
Cook's Rock; awash	41 4 30	174 32 0	"				770
Te-awa-iti	41 13 40	174 19 0	"				770
Port Underwood; N.E. pt. of entr.	41 20 15	174 10 15	Bethune.	16 0			771
Wairau River	41 27 0	174 4 0	Charts.	(1837)			772
Cape Campbell	41 40 0	174 22 4	D'Urville.				773
Kaikora or Looker's-on Bay; entr. of river	42 17 0	173 47 54	"				774
Banks's Peninsula; Port Cooper, } or Victoria; Lyttleton; well }	43 36 42	172 44 18	Stokes, 1849.	17 0	3 50	4 to 7	775
Port Levy or Albert; Toloo Head	43 36 40	172 50 10	"				776
Pigeon B.; Wakaroa or Wakaroa P.	43 35 35	172 56 15	"				777
Banks's Peninsula, S.E. point	43 52 15	173 0 0	"				777
Akaroa Harbour; Oba.	43 51 9	172 59 39	D'Urville.				777
Waitangi River	44 56 0	171 1 0	Charts.				779
Waikouaiti	45 39 0	170 45 0	"				779
Otago Harb.; Tairoa, or N.E. hd.	45 46 48	170 43 12	Kettle.				779
" " Fishery Point	45 48 45	170 49 4	D'Urville.				—
" " Dunedin	45 54 0	170 35 0	Charts.				781
Cape Saunders	45 53 45	170 50 54	D'Urville.				782
Coal Point	46 19 0	170 3 0	Charts.				782
Clutha, Molynieux, or Matou River	46 26 15	169 52 57	D'Urville.				782
The Naggetts	46 31 0	168 50 0	Charts.				783
Tautuku	46 41 0	168 33 0	"				783
The Bluff, or Bloomfield Har.; entr.	46 40 0	168 31 0	"				783
Ruabuki Id.; (Roebuck? S.W. pt.)	47 12 20	166 35 24	D'Urville.				783
New River; entrance about	46 25 0	168 20 0	Charts.				783
Aparima or Jacob's River	46 20 0	168 10 0					
STEWART ISLAND, or NEW LEINSTER;							
The Neck, or Paterson's River	46 58 0	168 17 0					783
Pegasus, or S. Port; Cable Isld.	47 16 0	167 40 0					783
South Cape	47 22 0	167 31 9	D'Urville.				784
The Snares; Long Island	48 3 0	167 9 27	"				784
The Traps; N. Islet	47 27 0	167 52 0	Vancouver.				784
Middle Island continued:—Chalky Bay; Port Preservation	46 1 0	166 36 0	Duperrey.				785
Dusky Bay; Five Fingers Point	45 43 30	166 27 0	Vancouver.				785
West Cape	45 56 0	166 8 0	"				785
Break Sea Island	45 35 0	166 40 0	"				787
Cape Paterson	45 24 0	166 30 0	Charts.				—
Doubtful Harbour; Pt. February	45 12 0	167 0 0	Bausa.				788
Caswell Bay	44 58 0	167 20 0	Charts.				788
Milford Haven	44 30 0	168 5 0	"				788
Awarua or Wakatip River; mth.	44 21 0	168 26 0	"				788
Cascade Point	43 55 0	168 30 0	"				788
Titihia Head	43 31 0	169 55 0	Brunner.				788
Bold Head, or Paramata	42 58 0	170 58 0	"				788
Arakura or Brunner River	42 50 0	171 6 0	"				788
River Gray, or Mawhera; Miss. St.	42 31 0	171 15 0	"				788
Five Fingers Peaks	42 4 0	171 25 0	D'Urville.				788
Cape Foulwind	41 46 0	171 29 0	"				788
River Buller, or Kawatiri	41 45 0	171 40 0	Brunner.				788
Rocky Point	40 54 0	172 10 0	D'Urville.				789
South Wanganui Harbour; entr.	40 34 0	172 37 30	"				789
Cape Farewell	40 28 0	172 48 0	"				789

	Discoverer.	Lat. South.	Lon. West.	Authority.	Page.
XXII. — ISLANDS BETWEEN LATITUDES 20° & 40° SOUTH.					
Juan Fernandez; Fort Juan Bautista	Fernandez, 1563.	33 57 45	78 53 0	King.	791
Massfuera; summit	"	33 48 30	80 51 10	De Petit Thouars.	794
St. Ambrose Island; summit	"	36 18 36	79 54 34	"	795
St. Felix Id.; sum. (Var. 14° 15' E.)	"	26 16 0	80 6 56	"	796
A Reef (?)	"	26 20 0	94 35 0	"	796
A Reef (?)	"	32 0 0	95 15 0	"	796
Sala-y-Gomez Island; (Gwyn Rock)	Gomez, 1793.	26 27 46	105 20 8	Beechey.	796
S.E. extreme					
Tespy, Waihu, or Easter Island	Roggewein, 1721.	27 8 46	109 24 36	"	797
Perouse Point; Cook's Bay	Dougherty, 1841.	59 20 0	120 20 0	Dougherty.	798
Dougherty Island	Vancouver, 1791.	27 57 40	144 15 0	Bellingshausen.	798
Oparo or Rapa Island	Stutchbury, 1827.	27 0 0	146 16 45	Stutchbury.	799
Nielson (Osborne, Lancaster) Reef	Bass.	28 5 0	142 45 0	"	799
Bass Isles					
TOUBOUAI OR AUSTRAL ISLANDS.					
Ravaivai or Vavatao Island	Broughton, 1791.	23 42 0	147 11 0	Broughton.	800
A Reef	"	24 45 0	148 20 0	Hamond.	800
Toubouai Island; N. end	Cook, 1777.	23 22 10	149 23 57	Bethune.	800
Oheteroah, or Rouroutoua, 1,300 feet	" 1769.	22 29 0	150 20 25	Thompson, R.N.	800
Group of Islands		21 50 0	150 0 0	"	800
Rimitera Island; 300 feet	Henry.	22 40 0	152 59 49	Thompson.	800
Sands Island	Sands, 1845.	21 50 0	154 0 0	Sands.	800
Island			155 0 0	"	801
COOK'S ISLANDS.					
Mangaia, or Mangesa	Cook, 1777. [1814.	21 57 0	158 7 0	Cook.	801
Rarotonga; N. end	<i>The Seringapatam,</i>	21 15 30	159 44 17	Bethune.	802
Rurutu Island	"	20 20 0	160 0 0	"	803
Atiu, or Wataseo; centre	Cook, 1777.	19 58 0	158 4 23	"	803
Takutes, or Wenosette	"	19 51 0	158 23 0	Cook.	804
Mitiero; centre	Dibbs, 1823.	19 49 45	157 34 0	Bethune.	804
Mauki, or Parry's Island	"	20 7 0	157 11 0	"	804
Hervey Islands	Cook, 1773.	19 18 0	158 54 0	"	804
Aitutake, or Whytootaké	Bligh, 1798.	18 52 0	159 41 0	Bligh.	804
New Island	"	24 10 0	159 20 0	Dutailis; Hamond.	805
Island	"	22 30 0	162 51 0	Hamond.	805
Beveridge Reef; Lagoon Reef; K. George Reef; Middleton Reef	Nicholson.	20 2 0	167 49 0	Sir E. Belcher.	805
TONGA OR FRIENDLY ISLANDS.					
Pylstaart Island (Sola Island)	Tasman, 1643.	22 24 45	176 4 0	Freyeinet.	810
Ono Islands	"	20 39 0	178 40 0	Bellingshausen.	811
Simonoff Island	Bellingshausen.	21 2 50	178 46 20	"	811
Eoa, or Eoa, or Middelburg; N.W. part	"	21 20 30	174 52 0	Chart.	811
Cattow Island	Tasman, 1643.	21 30 0	175 1 0	"	811
Tonga-tabu; Panghai-motu Island	"	21 8 19	175 14 15	{ Cook; D'Urville; D'Entrecasteaux	812
North Star Reef	Sir E. Home, 1844.	19 20 0	173 45 0	Home.	815
Namuka (Annamooka) Island	"	20 15 0	175 2 0	Charts.	816
Culebras Bank	Maurelle, 1781.	20 22 0	175 52 0	"	816
Hapai Island; Lefouka	"	19 48 12	174 20 0	Worth.	817
Tofua Island, 2,800 feet	"	19 45 0	175 3 0	D'Urville.	817
Kao Island, 5,000 feet	"	19 41 35	174 59 50	"	817
Disney Shoal	Disney, 1841.	19 15 0	173 40 0	Disney.	818
Homer Shoal	"	19 4 0	174 39 0	Home.	818
Vavau; Port Refuge; Neafo village	"	18 38 20	174 55 0	"	818
Lette or Lette Island, 1,600 feet	"	18 45 15	174 28 0	D'Urville.	820
Amargura, or Fanoualei, or Gardner's Island	Maurelle, 1643.	18 2 0	174 16 0	Worth.	820
Minerva Reefs	Nicholson, 1818.	23 35 0	178 0 0	Nicholson.	820
Favorite Reef	Bethune, 1842.	23 35 0	179 11 0	Bethune.	820

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	Discoverer.	Lat. North.	Lon. West.	Authority.	Page.
KERMADEC ISLANDS.					
	[1793.	29 12 0	178 15 0		
Raoul or Sunday Island	D'Entrecasteaux,	30 16 0	178 32 0	Wilkes.	821
Macaulay Island, 750 feet	Watts, 1788.	30 36 0	179 14 0	D'Urville.	821
Curtis Island	"	31 27 30	178 55 0	D'Entrecasteaux.	821
L'Espérance (Brind's or French) Rk.	D'Entrecasteaux.	31 18 0	178 52 0	"	821
Havre Rock	"		Lon. East.		
Dry Shoal	" 1838.	21 40 0	174 40 0	"	821
Matthew Island	Gilbert, 1788.	22 27 0	172 10 33	Wilkes.	821
Hunter Island	Fearn, 1798.			"	822
La Brillaute Shoal, 6½ feet	Dubouzet, 1847.	23 13 52	169 55 38	Dubouzet.	822
Walpole Island	Butler, 1794.	22 40 0	169 15 0	Butler.	822
Durand's Reef	"	22 6 0	169 2 0	"	822
NEW CALEDONIA.					
	Cook, 1774.				
Cape Queen Charlotte		22 16 0	166 55 0	Cook.	824
Cape Prince of Wales		22 29 0	166 38 0	"	824
Botany Island		22 47 0	167 1 0	"	824
Waakzaamheyd Bay; S. extr.		23 3 0	166 50 0	Hunter.	824
Ile of Pines; Peak		22 38 0	167 25 0	"	824
Port St. Vincent		22 10 0	165 55 0	Kent.	827
Point Goulvain		21 46 0	165 28 0	D'Entrecasteaux.	828
Sand Island		21 35 0	165 8 0	"	828
Ile des Contrariétés		21 29 0	164 57 0	"	828
Cape Deverd		20 51 0	164 18 0	"	828
Cape Tonnerre		20 24 0	164 0 0	"	828
D'Entrecasteaux or Bond Reef		17 52 40	162 41 47	D'Urville.	830
Huon Island		17 59 7	162 55 14	"	830
Balade Harbour		20 17 15	164 25 0	D'Entrecasteaux.	830
Cape Colnett		20 29 0	164 44 0	Cook; D'Entrecas-	830
Cape Coronation		22 2 0	167 47 0	Cook. [teaux.	830
LOYALTY ISLANDS.					
Burrow's Island		21 59 0	168 30 0	The Pearl.	831
Mari Island; S.W. end		21 37 0	168 22 0	"	831
Britannia, Uea, or Mingavi Island;					
Cape Coster		21 25 30	167 59 56	D'Urville.	832
" Cape Roussin		21 21 45	167 48 32	"	832
Boucher Isle		21 8 0	167 51 0	"	834
Chabrol, Lifu, or Wetsi I.; C. Pines		21 4 30	167 20 3	Dutailis.	835
" " C. Escarpé		20 40 25	167 10 4	"	835
Halgan, Ones, or Hive I.; C. Rossel		20 33 33	166 26 14	"	836
Beaupré Islands		20 26 15	165 10 34	D'Urville.	837
Astrolabe Reef; N. point		19 40 20	165 26 24	"	837
Simpson Reef	Simpson, 1846.	21 30 0	166 50 0	Simpson.	837
Petrie Reef (Betay Reef)	Petrie, 1835.	18 35 0	164 22 0	Petrie.	837
Vasquez Island	Maurelle, 1781.	24 44 0	177 41 0	p. d.	837
Rosaretta Shoal		30 10 0	173 45 0	p. d.	838
Ross Bank; 400 fathoms	Sir James Ross, 1841.	33 32 0	167 40 0	Ross.	839
Norfolk Island; Mount Pitt	Cook, 1774.	28 58 0	167 46 0	Charts.	839
" " Nepean Island		29 2 0	167 48 0	"	840
Elizabeth or Seringapatam Reef		30 5 0	159 0 0	Horaburgh.	840
Eliza Reef (Middleton Reef)		29 30 0	158 30 0	"	840
Middleton Island		27 58 0	160 31 0	Flinders.	840
Middleton Shoal		29 14 0	158 53 0	"	841
Island		31 19 0	160 42 0	"	841
Favorite Shoal		26 6 0	160 0 0	"	841
Rock		24 0 0	160 15 0	"	841
Capel Bank		25 14 51	159 18 15	H.M.S. Hyacinth.	841
XXIII.—LOW ARCHIPELAGO, OR PAAMUTO GROUP.					
			Lon. West.		
Ducie Island	Edwards, 1791.	24 40 20	124 48 0	Beechey.	844
Henderson or Elizabeth Island	Henderson.	24 21 8	128 18 30	"	845

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Pitcairn Island; Adamstown	Carteret, 1767.	25 3 37	130 8 25	Beechey.	846
Oeno Island; N. point	Henderson.	24 1 20	130 41 0	"	850
Crescent Island, or Temoe	Wilson, 1797.	23 20 29	134 35 8	"	850
Gambier Islands, or Manga Rava; Mount Duff, 1,248 feet	"	23 7 58	134 55 21	"	850
Lord Hood's Island, or Marutea	Edwards, 1791.	21 30 50	135 33 19	"	852
Alaria Id. (Denis or Wright's Id.)	Ebrill, 1832.	22 5 0	136 0 0	Ebrill.	852
Amphitrite or Actson Island	" 1833.	21 18 30	136 38 0	Biddlecombe, 1837.	853
" Bedford Island	"	21 23 0	136 32 0	"	853
" Minto Island	"	21 28 30	136 27 0	"	853
" Melbourne Island	"	20 44 53	138 19 28	Beechey.	853
Carysfort Island, or Turfeis	Edwards, 1791.	22 12 0	138 40 0	"	853
Cockburn Island	Beechey, 1826.	21 50 32	138 44 28	"	854
Osnaburgh Island (Matilda Reef)	Carteret, 1767.	21 27 41	140 37 58	"	855
Bligh Island, or Hereheretua	Bligh, 1792.	"	"	"	855
Gloucester or Margaret Island,	"	"	"	"	855
Nukutipipi, or Nihirou	Carteret, 1767.	20 23 0	143 37 0	Wilkes.	855
Coronados, or Four Crowns, or Tiku	Quiros, 1606.	20 38 0	143 22 0	"	855
Sau Miguel Arcangel, or Heretua	"	20 23 0	143 47 0	"	855
San Pablo	"	19 56 0	145 0 0	"	855
St. Elmo (?)	"	21 20 0	143 50 0	"	856
Britomart Island (1)	" 1822.	19 52 0	145 23 0	"	856
Faith Island	"	21 10 0	138 52 0	"	856
Barrow Island, or Teku	Beechey, 1826.	20 45 7	139 3 9	Beechey.	856
Whit Sunday I., or Temata-lei-u-wau	Wallis, 1767.	19 17 40	138 42 28	"	856
Clermont Tonnerre Island	Duperrey, 1822.	18 33 42	136 20 0	Wilkes.	856
Serie Island, or Apucarua	Wilson, 1797.	18 22 39	136 55 3	Beechey.	858
Egmont Island, or Tatakoto	Wallis, 1767.	19 22 59	139 12 3	"	858
Tres Cocotiers Island	Mauruc.	19 8 0	139 22 0	"	859
Byam Martin Island, or Nganaiti	Beechey, 1826.	19 40 22	138 22 28	"	859
Cumberland Island, or Manuwangi	Wallis, 1767.	19 13 0	141 11 0	"	859
Gloucester Island, or Hariri, or Toué-toué	"	19 8 0	140 37 0	"	859
Lanciers or Thrum Cap Island, or Pukerua	"	"	"	"	859
Queen Charlotte's Ids., or Aki-Aki	Bougainville, 1768.	18 30 8	139 8 0	"	859
Four Facardias or Lagoon I., or Teay	Wallis, 1767.	19 17 40	138 42 28	"	860
Narcissus or Clerke Island, or Puka	Bougainville, 1768.	18 42 26	138 43 12	"	860
Puka, or Tatakoto	Bonecheo, 1774.	17 20 0	138 23 0	Duperrey.	860
Anonymous Island	"	17 0 0	138 40 0	Mauruc.	860
Moller Island, or Amanu	Bellingshausen, 1829.	17 43 0	140 47 0	Bellingshausen.	860
Ilape or Bow Island, Heyou,	"	"	"	"	860
Ocheou, or Eaoo; N.E. entr.	Bougainville, 1768.	18 6 0	140 48 0	Beechey.	860
Prince William Henry or L'Ost- tango Island, or Négonégo	Wallis, 1765.	18 43 0	141 39 30	Duperrey.	862
Two Groups, or Morocao and Raou- wabéré, or Manaka and Dawhaida;	"	"	"	"	862
N. extremity	Cook, 1773.	18 18 10	142 6 45	Beechey.	862
Buyer's Group, or Rébérétoua	Buyers, 1803.	18 20 0	143 40 0	"	862
Bird Id., Reïtouroa, or Hekuera	Cook, 1769.	17 48 0	143 4 50	Beechey.	863
Melville Island, or Scouerou, or Tetukota	"	"	"	"	863
St. Simon or Resolution Island, or Tawere	Beechey, 1826.	17 35 0	142 39 12	"	863
Humphrey Island (?)	"	"	"	"	863
Merrill Island (?)	Bonecheo, 1772.	17 22 20	141 24 0	"	863
Predpriatie Island, Kainga, or Aka- haina, or Prince de Joinville	" 1822.	16 52 0	140 30 0	"	863
Honden or Dog Id., or Hanuake	Merrill, 1832.	16 38 0	141 0 0	"	863
Disappointment Ids., or Wytoohoe	"	"	"	"	863
" Otohoo	"	"	"	"	863
Arakcheeff Id., or Astad, Nanatao,	Kotzebue, 1824.	15 58 18	140 11 30	Kotzebue.	863
Abangatau, or Maroupo	Le Maire, 1616.	14 55 40	138 47 36	Wilkes.	864
Wolkhonsky Island, or Takures, or Tacumi	Byron, 1765.	14 9 30	141 17 50	"	864
Barclay de Tolly Island, or Roroia	"	14 10 0	141 5 0	Worth.	865
"	"	"	"	"	865
"	Bellingshausen, 1820.	15 51 20	140 50 50	Kotzebue.	865
"	"	15 38 0	142 6 0	Bellingshausen.	865
"	"	16 12 0	142 30 0	"	865

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Nigeri or Nihiru Island . . .	Bellingshausen, 1819.	16° 38' 0"	142° 42' 0"	Bellingshausen.	866
Holt or Yermaloff Island, Otáena, or Taenga . . .	Turnbull, 1803.	16 20 0	143 6 0	"	866
Furneaux Island, or Morotea . .	Cook, 1773.	17 3 0	143 6 0	Krusenstern.	866
Tchitchagoff Island, Tahanea, Ta- néa, or Famia . . .	Bellingshausen, 1820.	16 45 0	144 36 0	Wilkes.	866
Chain Island, or Anaa, or Anhar .	Cook, 1769.	17 23 0	145 38 0	"	866
Doubtful Island; Tecocota . . .	" 1773.	17 20 0	142 23 0	Beechey.	867
Raeffakoy Islands; W. extremity .	Bellingshausen, 1820.	16 43 0	144 11 0	Bellingshausen.	867
Louise or Ofiti Island . . .	Mauruc, 1831.	16 49 0	144 20 0	Wilkes.	867
St. Quentin or Croker Island, Ma- raiki, or Feraiqui . . .	Bonecheo, 1772.	17 26 0	143 26 0	Beechey.	867
Adventure Island, or Motutunga . .	Cook, 1773.	17 4 0	144 14 0	"	867
Philips Island, or Makemo . . .	The Margaret, 1803.	16 27 0	144 1 0	Bellingshausen.	868
Saken Island, or Katii . . .	Bellingshausen, 1822.	16 25 0	144 30 0	"	868
Miloradowitch Island, or Faiti . .	Bellingshausen, 1819.	16 42 0	145 19 0	"	868
Wittgenstein, or Faarava . . .	"	16 4 0	145 39 0	"	868
Raraka Island . . .	Ireland, 1831.	16 6 25	144 57 40	Wilkes.	868
Tairo, or Tai-a-ra, or King's Island	FitzRoy, 1835.	15 42 25	144 36 45	"	869
Carla-Hof Id., Ovateia, or Aratica .	Roggewein, 1722.	15 26 0	145 39 46	"	870
Cavahi, Kawabe, or Vincennes Id.	FitzRoy, 1835.	15 39 48	145 9 30	"	870
Palliser, Schadelyk, or Pernicious Islands; Toau, or Elizabeth Id. . .	Roggewein, 1722.	15 58 0	145 48 0	FitzRoy.	871
Aura or Kaurua Island . . .	"	15 43 0	146 48 0	Kotzebue.	871
Hagemeister or Opatiki Island . .	Hagemeister, 1830.	15 18 0	146 12 0	"	871
Rurick Island or Arutua . . .	Kotzebue, 1815.	15 10 0	146 47 0	Wilkes.	871
Romanzoff Island, Tike, or Manou .	"	14 57 20	144 35 0	Kotzebue.	871
King George Ids., Tiokoos, or Taroa	Le Maire, 1616.	14 31 12	145 9 30	Wilkes.	872
Oura, or Teputa, or Spiridoff . . .	"	14 44 0	145 20 0	Kotzebue.	872
Waterlandt Island, or Manhihi . .	Le Maire, 1616.	14 26 22	146 4 20	Wilkes.	872
Peacock Island, or Abii . . .	"	14 35 0	146 27 0	"	873
Vliegen or Prince of Wales, or Dean Island, or Nairas; W. point . . .	Schouten, 1616.	15 5 15	147 58 34	"	873
Cecile Island . . .	"	15 30 0	148 20 0	(Dumoulin.)	874
Aurora or Metia Island . . .	Roggewein, 1722.	15 45 39	148 13 15	Wilkes.	874
Krusenstern Island, or Tikehaa . .	Kotzebue, 1815.	15 0 0	148 41 0	Kotzebue.	875
Lazareff Island, Malivi, or Matai- wa; W. end . . .	Bellingshausen, 1820.	14 54 0	148 44 30	H.M.S. Talbot.	875
XXIV.—SOCIETY ISLANDS.					
Maitea or Osnaburgh Island . . .	Wallis, 1767.	17 53 0	148 5 0	Cook.	882
TAHITI; Point Venus . . .	Quiros, 1606.	17 29 15	149 28 45	Beechey.	883
" Papiete Harb.; Moto Id. . .	"	17 31 35	149 33 50	Raper.	886
" N.W. pt.; Motu Ahouna . . .	"	17 34 0	149 37 30	Cook.	887
" S.W. point . . .	"	17 47 0	149 35 0	"	887
" Papara; S. point . . .	"	17 48 40	149 30 0	"	887
" Tiarraboo; S. point . . .	"	17 53 0	149 13 0	"	888
" N.E. point . . .	"	17 44 0	149 11 0	"	888
" Vairi; (Isthmus) . . .	"	17 44 0	149 21 0	"	887
Teturoa Island . . .	"	17 2 0	149 47 0	"	890
Eimeo Id.; perforated peak, 4,041 ft.	Wallis, 1767.	17 30 0	149 47 0	Wilkes.	890
Tapamanoa, Mauiti, or Sir Charles Saunders's Island; peak . . .	"	17 29 0	150 44 0	"	891
Huanheine Id.; Owbarre Harbour .	Cook, 1769.	16 43 0	151 7 0	Cook.	892
Raiatea, or Ulietea, Uturoa Harb.	Wallis, 1767.	16 50 0	151 24 0	Bethune.	892
" Ohamaneno Harbour . . .	"	16 45 32	151 36 22	Cook.	893
Tahaa, or Otaha . . .	Cook, 1769.	16 35 0	151 35 0	"	893
Bola-Bola, or Bora-Bora; Otea- vanua Harbour . . .	"	16 31 35	151 46 0	"	894
Marus, Maupite, or Manite . . .	"	16 26 0	152 12 0	"	894
Tubai, or Motu-iti . . .	"	16 11 0	151 48 0	"	895

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XXV. — ISLANDS BETWEEN LATITUDES 10° & 20° S.	Discoverer.	Lat. South.	Lon. West.	Authority.	Page.
Flint's Island	1801.	11 25 43	151 48 0	Wilkes.	896
Wootock Is. (Anne or Stavers' Id.)	Bellingshausen, 1820.	10 5 50	153 23 0	Bellingshausen.	896
Mopelia or Mopibá Island	Wallis, 1767.	16 50 0	154 21 0	Hamond.	896
Palmerston's Island	Cook, 1773.	18 5 50	163 10 0	(<i>Le Bucéphale</i> .)	896
Bellingshausen Island	Kotzebue, 1824.	15 48 0	154 30 0	Kotzebue.	896
Seilly Islands	Wallis, 1767.	16 28 0	156 10 0	Krusenstern.	897
Grand Duke Alexander, Reirson's I.	Bellingshausen, 1820.	10 2 0	161 9 0	Bellingshausen.	897
Humphrey Island	Patrickson, 1822.	10 30 0	161 2 0	Patrickson.	897
Souworoff Island	Lazareff, 1814.	13 20 0	163 30 0	Lazareff.	897
Gente Hermosa Islands	Quiros, 1606.	10 36 0	171 0 0		897
Danger Islands	Byron.	10 54 0	165 54 0	Bellingshausen.	897
Swain's Island	U. S. Ex. Ex. 1840.	11 5 0	170 55 13	Wilkes.	898
Ranger Island		11 35 0	166 45 0	Worth.	898
Nassau Island	Sampson, 1835.	11 30 0	165 30 0	"	898
SAMOA OR NAVIGATOR'S ISLANDS.					
Rose I. (Kordiukoff or Middleton I.)	Freycinet.	14 32 0	168 9 0	Sir E. Belcher.	900
Manna, Omanooau (or Opoun) Id.; village, N.W. side		14 19 0	169 28 0	U. S. Ex. Ex. 1839.	901
Orosenga, or Orisega (or Leoné) Island; S.E. point		14 14 0	169 34 0	"	901
Ofs (or Fanfoné) Id.; islet off W. pt.		14 12 30	169 38 0	"	901
Tutuila (or Maouna) Id.; Anau Id.		14 18 40	170 40 0	"	901
Fagaitua Bay; village		14 18 0	170 33 42	"	—
Pago-Pago Harb.; Ob. St. N. side		14 16 10	170 36 13	Bethune.	902
Sail Rock Point		14 22 30	170 41 0	U. S. Ex. Ex.	—
West Cape		14 20 45	170 48 15	"	—
Aleau Bay; Greyhound Point . . .		14 18 0	170 44 15	"	—
Fungater Harbour; anchorage . .		14 18 0	170 42 30	"	—
Cock's Comb Point		14 15 24	170 38 18	"	—
Osfonu Harbour; anchorage . . .		14 16 48	170 33 15	"	—
Aur Harbour; anchorage		14 17 0	170 33 0	"	—
Upolu Id.; Nuulua Islet, E. pt.		14 1 50	171 20 30	"	903
Faleaili Harbour; Cocoa-nut Is.		14 0 13	171 35 38	"	—
Senaapu Harbour; entrance . . .		13 57 47	171 44 27	"	—
Manono or Platte Island; centre .		13 50 10	172 1 0	"	903
Apia Harbour; village		13 48 56	171 41 9	"	903
Saluaufati Harbour; entrance . .		13 50 45	171 31 30	"	904
Falifa Harbour; centre		13 52 33	171 31 46	"	—
Fangalua Bay		13 53 30	171 28 10	"	905
Apolima Island		13 49 10	172 4 40	"	905
Savaii (Oteowhy or Pola) Island S.E. point		13 48 30	172 8 30	"	906
Paluale; village		13 45 0	172 13 0	"	906
S.W. point		13 48 40	172 28 40	"	906
Felialapa; W. point		13 30 30	172 45 0	"	906
Mataatua; N. point		13 28 0	172 18 0	"	907
Savage Island, or Iniué	Cook, 1774.	19 10 0	169 50 0	"	907
Cocos and Verraders Islands; Niuatapu- tabu Island, or Boscawen	Le Maire, 1616.	15 54 0	173 48 0	Bethune.	907
Verraders or Keppel Island	"	15 57 0	173 58 0	"	908
Three Islands		18 8 0	169 20 0	Charts.	908
Proby Island; Anoofof	Edwards, 1791.	15 53 0	175 57 0	Edwards.	908
Brinsmade Island (probably same?)	Wood, 1840.	15 37 0	175 25 0	Wood.	908
L'Enfant Perdu	Bougainville, 1768.	14 20 0	176 40 0	Bougainville.	908
Home Bank, 13 fathoms	Home, 1844.	12 53 8	175 31 0	Sir E. Home.	908
Uea, Uvea, or Wallia Island; Allier Bay, Fenuafu Island	Wallis, 1767.	13 13 35	176 20 52	Du Bouzet, 1841-2.	909
Horn Islands, Foutouna Island; Mount Schouten	Le Maire, 1616.	14 14 20	178 11 36	"	911
Alofa Island; Mt. Bougainville . .	"	14 19 0	177 21 30	"	—
XXVI.—FEEJEE ISLANDS.					
Vatoo or Turtle Island	Cook, 1773.	19 50 0	178 37 0	Worth (Cook).	916
Ong-Hee or Ongea; centre		19 4 0	178 30 30	U. S. Ex. Ex.	917

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Nugu Ongea Reef; centre		19° 8' 30"	178° 27' 30"	Survey by the U.S.	917
Boulang-Ha, Fulanga (or Laquaba); W. bluff		19 3 0	178 44 30	Ex. Ex.	917
Marambo, or Maramba		18 56 30	178 51 0	"	917
Kambara (or Appallo); S. point		18 56 35	178 57 40	"	917
Enkaba, or Fococaffa; centre		18 50 20	178 55 0	"	917
Taboune-siki, or Tubanaielli; centr.		18 42 10	179 5 15	"	917
Ang-Hasa, or Angasa, or Table Id.	Wilson.	18 55 0	178 32 0	"	918
Namuka (or Neat's Tongue); centr.	"	18 46 0	178 41 0	"	918
Komo-Levu; centre	"	18 38 0	178 40 30	"	918
Holo-Rousa, or Ularua, or Olenes		18 33 30	178 46 30	"	918
Mozé, or Motha		18 35 10	178 34 0	"	918
Oneata; Observatory Island		18 24 25	178 31 45	"	918
Echouas or Aiva Islands		18 20 0	178 45 0	"	919
Laguemba, or Lakemba; Kendi Pk.		18 14 10	178 49 0	"	919
Argo Reef, or Bocatatanoa; S.E. ex.		18 17 0	178 22 0	"	919
Neaou, or Naiau (or Oedida); sum.		17 59 0	179 1 0	"	919
Vanna Vatu; centre		18 22 30	179 20 0	"	931
Tabutha; N.W. peak		17 37 30	178 39 0	"	920
Aro Island		17 41 0	178 38 35	"	920
Gordon Reef		17 39 30	178 33 20	"	920
Dazia, Chichia, or Favorite Island; S.E. point		17 48 0	179 16 0	"	920
Mang-Ho, Mango, or Cox Island; S.E. end		17 29 0	179 7 0	"	920
Vekai Island		17 32 20	178 49 0	"	920
Katafanga Island		17 30 0	178 41 0	"	920
Malevuvu Reef; S. end		17 25 0	178 41 0	"	920
Munia or Hadow's Island; peak	Wilson.	17 21 40	178 52 30	"	921
Ticumbia, or Van Shirnding's Id.	"	17 16 0	178 47 0	"	921
Susui, or D. Scott's Id.; S. point	"	17 21 25	178 57 0	"	921
Malatta Island; centre		17 20 30	178 59 0	"	921
Vanna-Valavo, or Sir Charles Mid- dleton Island; N.W. point	Wilson.	17 10 0	179 2 50	"	921
Nuku Tikombia Reef; E. extrem.		17 20 0	178 37 30	"	921
Avia or Curling's Island; centre	Wilson.	17 11 0	178 54 10	"	921
Osabu, or Three Brothers		17 19 40	178 50 0	"	921
Kanazea, or Kanathia, or Sims Is- land; S. point	Wilson.	17 17 20	179 7 0	"	922
Froat's Reef		17 23 0	179 12 0	"	922
Malina, or Scar's Island	Wilson.	17 8 0	179 10 15	"	922
Batou-bara or Vatu rera Island	"	17 29 0	179 31 0	"	922
Azata, or Ythata, Hamilton, or Cap Island; peak		17 17 0	179 28 30	"	922
Nongou-Toulou Island; S.W. one		17 18 30	179 33 10	"	922
Neita-Oumba, or Naitamba, or Di- rection Island; centre	Wilson.	17 3 0	179 14 0	"	922
Okimbo Island		17 2 40	179 1 0	"	922
Yalangala or Low Island	Wilson.	16 49 30	179 4 40	"	923
Look-out Reef; E. extreme		16 54 0	178 42 0	"	923
Velerara Island		16 52 0	178 59 0	"	923
Nanuku or Warner Island	Wilson.	16 31 30	179 25 40	"	923
Nukumanu or Sandy Island	"	16 19 10	179 24 40	"	923
Nukumbasanga Island		16 18 0	179 16 25	"	923
Duff Reef	Wilson, 1797.	16 25 0	179 29 0	"	923
Clusters, or Janoudza Id.; Budd Id.	"	16 25 30	179 38 30	"	923
Korotuna Island; Charybdis Reef		16 2 20	179 24 0	"	923
Nuku-Levu Reef; E. end		16 7 0	179 14 30	"	923
Zigombia, or Chicobea, or Farewell Island; N. hummock	Wilson.	15 47 30	179 52 0	"	924
Taba-ouni or Vuna Island; N. pt.		16 40 20	179 50 35	"	924
Somu-Somu; town		16 46 0	179 58 0	"	924
Vuna, or S. point		17 1 0	180 4 0	"	924
Ongomea or Kamia Island; summ.		16 46 0	179 42 0	"	925
Laoudzala or Louthalu Island; E. point		16 46 0	179 37 40	"	925

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		° ' "	° ' "		
Vanu-Lebou or Vanua-Lovu Island	Wilson.	16 8 0	179 55 50	Survey by the U.S.	925
Unda, or N.E. Pt. (Edward's Id.)	"	16 24 0	179 53 40	Ex. Ex.	925
Rambé I. or Gillet's I.; N.E. pt.	"			"	925
			Lon. East.		
Kea or Tate's Island; Port Safety	"	16 37 0	179 57 0	"	925
Baino Harbour; entrance .		16 45 30	179 50 30	"	925
Savu-Savu Bay; E. point .		16 49 20	179 16 0	"	926
Waicama Hot Springs .		16 46 5	179 20 0	"	926
Kombelau Point; extremity .		16 25 25	179 2 0	"	926
Nemena or Direction Island		17 6 0	179 6 30	"	926
Sua Lib Bay .		17 0 0	178 48 0	"	926
Mbua or Sandalwood Bay .		16 48 10	178 29 10	"	927
Dimba-Dimba Point .				"	
Yendua Is. Porpoise Hr.; Obs.		16 50 0	178 14 41	" Var. 9°30'E.	928
Anganga Island; W. point .		16 35 40	178 32 30	"	928
Nucumurry Harbour; Island .		16 42 40	178 32 0	"	—
Naloe Bay; Tavea Island .		16 38 20	178 43 0	"	928
Wailea Bay; Leonidas Island .		16 38 25	178 36 50	"	—
Nucumbati Island .		16 28 0	179 0 10	"	928
Muthuata; town .		16 27 20	179 2 15	"	928
Kie Island .		16 14 15	179 4 20	"	928
Mali Island; W. point .		16 21 10	179 17 30	"	929
Sau Sau Passage .		16 10 30	179 29 0	"	929
Koro, Goro, or Goroo Id.; N. pt.		17 13 0	179 26 0	"	929
Kaumonu or Horse-shoe Reef		17 36 45	179 19 30	"	929
Neirai, or Nairai, or Nirie Island;					
N.E. point .		17 49 40	179 30 0	"	929
Mothea, or Eliza Reef .	The Eliza, wr. 1809.	17 55 0	179 30 0	"	930
Cobu Rock .		17 52 35	179 29 15	"	930
Venemole Bay .		17 47 0	179 26 0	"	930
Toaloe .		17 45 30	179 27 5	"	930
Nhao or Angau (Neow Id.); N. pt.		17 56 10	179 20 30	"	930
Lobo Hill; S.E. point .		18 0 30	179 20 3	"	930
Mumbolithe or Mumbolittee Reef.	D'Urville.	18 15 40	179 23 30	"	931
Vateki or Ambatiki Id.; summit		17 46 40	179 10 20	"	931
Mouala or Moala (Mywoolla? or	Bligh, 1792; or				
Meria Eavou) .	D'Urville.	18 41 0	179 53 0	"	931
Tova Reef, 2 feet; S. point .		18 41 0	180 24 0	"	931
Totoua or Totoia Island; S.E. pt.	D'Urville.	18 57 25	180 8 0	"	931
Matougou or Matuku; S. point .		19 13 50	179 44 0	"	932
Carr's Harbour .	"	19 11 20	179 44 0	"	932
Mbenga Island, Sawau Harb.; entr.		18 22 0	178 9 10	"	934
Namuka Island; summit .		18 23 0	178 58 25	"	934
Viti-Lovu Island, Rewa Harbour;					
Nukulau Island .		18 10 50	178 30 40	"	932
Suva Harbour; entrance .		18 7 0	178 23 0	"	934
Ndronga .		18 6 0	177 22 0	"	934
Navula Passage; Waldron Id. .		17 53 40	177 7 0	"	935
Malolo Island; N. point .		17 46 0	177 6 20	"	935
Chaptal or Hudson's I.; Carr I.		17 37 0	177 0 0	"	935
Underwood Group; Henry Id. .		17 40 50	177 15 35	"	935
Ba Passage .		17 35 0	177 25 0	"	935
Ba (town of) .		17 27 0	177 37 0	"	935
Dongaloe .		17 21 0	177 46 30	"	935
Malaki Island; N. point .		17 16 30	178 7 20	"	936
Ovalu or Passage Island .		17 22 0	178 47 50	"	936
Mokundraga Island .		17 24 20	178 58 40	"	936
Mokungai Island; E. point .		17 26 0	179 0 0	"	936
Wakai Island; S. point .		17 38 45	179 1 35	"	936
Onalau or Ovolau Island; Levuka					
Harbour; Observatory Point .		17 40 47	178 52 41	" Var. 9°30'E.	937
Matoriki or Moturiki Id.; S. pt.		17 46 0	178 47 30	"	938
Leluvia Island .		17 47 30	178 45 0	"	938
Ambau or Bau Island .		17 57 30	178 38 15	"	938
Kamba Point .		17 59 30	178 43 30	"	938
Vatu-Lele Island; N. point .		18 31 0	177 35 0	"	939

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Flying Fish Shoal		18 35 30	177 46 30	Survey by the U.S.	939
Kandabou or Kantavu; peak		19 1 0	178 18 0	Ex. Ex.	939
" Cape Bligh		19 0 0	178 23 30	"	939
" Tabuca Bay		19 2 0	178 5 0	"	940
" S.W. point		19 17 20	177 57 45	"	940
Astrolabe Reef; N. point		18 42 0	178 28 0	"	940
Assau Group; Vomo Island		17 29 0	177 13 0	"	940
Bitonho Island		17 27 30	177 0 0	"	941
Waia Island; peak		17 17 40	177 4 35	"	941
Waialailithake; Observatory Pk.		17 23 0	177 5 0	"	941
Agate Island		17 13 0	177 12 0	"	941
Naviti Island; N.E. point		17 2 30	177 15 0	"	941
Matathoni Levu Island		16 57 0	177 18 0	"	941
Ya-Assau Id.; Tau-tha-ke Peak		16 50 15	177 23 30	"	941
Asana Island		16 44 0	177 28 0	"	941
Timboor Island		16 42 30	177 28 10	"	941
Awakalo or Round Island		16 40 30	177 43 0	"	941
Bivoua or Biva Island; W. point		17 9 0	176 54 0	"	941
Porpoise Shoal		17 1 0	176 59 0	"	941
XXVII.—NEW HEBRIDES, &c.					
Annatom; S.W. point		20 11 25	169 35 44	D'Urville.	942
Erronan (or Footoons); summit		19 31 20	170 6 20	"	943
Irritoe Island (?)		19 54 0	170 10 0	"	943
Tanna Island, Port Resolution; Cook's Pyramid	Cook, 1774.	19 31 17	169 29 0	Sir Edw. Belcher.	944
Immer Island		19 21 0	169 31 0	Charts.	945
Erromanga Island; Traitor's Head		18 46 0	169 15 0	"	946
Sandwich Island; S.E. point	Cook, 1774.	17 52 0	168 35 0	"	947
Montagu Island	"	17 26 0	168 17 0	"	947
Three Hills Island	"	17 4 0	168 19 0	"	947
Two Hills Island; Monument Rock	"	17 0 0	168 35 0	"	947
Apee Island; N. point	"	16 36 0	168 10 0	"	947
Paoom Island; E. islet	"	16 26 0	168 28 0	"	947
Ambrym Island; S. point	"	16 14 0	168 19 0	"	947
Mallicollo Island; Port Sandwich		16 25 0	167 46 0	Cook.	948
Maskelyne Islands	Cook.	16 32 0	168 19 0	"	949
Whitsun or Pentecôte Island	Bougainville.	15 59 0	168 19 0	"	949
Aurora Island; N. point	"	14 56 0	168 5 24	D'Urville.	949
Lepers' Island; centre	"	15 22 0	167 54 0	Cook.	949
Pic de l'Etoile; summit	"	14 29 40	168 4 55	D'Urville.	949
Espiritu Santo Id.; C. Cumberland	Quiros, 1606.	14 43 0	166 40 0	Cook.	951
" " Cape Lisburne		15 40 0	166 44 0	"	951
" " St. Philip and St. Jago Bay; Cape Quiros		14 55 0	167 5 0	"	953
Banks Id.; Great Id., N. summit	Bligh, 1789.	13 47 20	168 32 14	D'Urville.	954
" N. Island; summit		13 36 0	167 22 0	"	954
" N.E. Island; summit		13 43 0	167 43 54	"	954
Claire Island	D'Urville, 1838.	14 20 45	167 47 24	"	954
Sugar Loaf Island; summit	"	14 52 45	167 45 14	"	954
SANTA CRUZ ISLANDS.					
Vanikoro Island; Mount Kapogo	Edwards, 1791.	11 36 30	136 53 24	"	957
" Oaili Harbour		11 40 24	166 52 0	"	956
Nitendi, or Sta. Cruz Id.; C. Byron	Mendaña.	10 41 10	166 10 9	"	959
" Cape Boscawen; S.W. point		10 51 15	165 38 54	D'Entrecasteaux.	959
" Guerta or Trevanion Island		10 40 0	165 45 30	Carteret.	959
Tinakoro or Volcano Island	Mendaña.	10 23 10	165 49 34	D'Urville.	959
Mendaña or Duff's Group; Taumaco or Disappointment Island	"	9 57 0	167 0 0	Wilson.	960
Bayonnaise Bank	Tromelin, 1828.	12 8 30	180 16 30	Tromelin.	961
Meek Shoal	Meek, 1832.	10 40 0	179 8 0	Meek.	961
Rotumah, Rotuam or Grenville Island; Atangota Island	Edwards, 1791.	12 32 0	177 13 0	Duperrey.	961
Eagleston Reef	Eagleston.	12 30 0	178 0 0	Eagleston.	962

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Isabella Shoal	Pearson, 1839.	12° 25' 0"	177° 15' 0"	Pearson.	962
A Reef		15 32 0	175 20 0	Hamond.	962
Onaseuse, or Hunter Island	Hunter, 1823.	15 31 0	176 11 0	Hunter.	962
Carter's Reef		15 42 0	176 28 0		962
A Reef		18 10 0	175 10 0		962
Charlotte Bank	1788.	11 50 0	173 12 0		962
Pandora Reef	Edwards, 1791.	12 11 0	172 7 0	Edwards.	962
Mitre Island, or Fataka	"	11 56 0	170 20 0	Kroutcheff.	963
Annula or Cherry Island	"	11 35 0	170 0 0		963
Tucopia, or Barwell Island	Quiros, 1606.	12 21 10	168 43 30	Tromelin.	963
XXVIII.—GALAPAGOS ISLANDS.					
Albemarle Island; Tagus Cove		0 15 55	91 26 45	The Survey by	968
" " Port Christopher		0 54 0	91 35 0	Capt. R. Fitz-	968
" " Iguana Cove		0 59 0	91 32 15	Roy, in H.M.S.	968
" " Cape Woodford		0 46 0	90 52 0	Beagle.	969
" " Cape Marshall		0 3 0	91 17 0	"	969
" " Point Albemarle		0 10 0 N	91 27 0	"	970
Redondo Rock, 85 feet		0 13 30	91 40 0	"	970
Narborough Island, Cape Douglas; N.W. extremity		0 20 0 S	91 44 45	"	968
" " Cape Hammond		0 31 0	91 40 0	"	969
Culpepper Island; summit		1 22 56 N	91 53 30	"	970
Wenman Island; N.W. summit		1 39 30	92 4 30	"	970
Abingdon Island; summit		0 34 25	90 48 10	"	970
Bindloe's Island; S. summit		0 18 50	90 33 55	"	971
Tower's Island; W. cliff		0 20 0	90 2 30	"	971
James Island; Sugar-loaf, 1,200 ft.		0 15 20 S	90 56 40	"	971
" " James Bay		0 12 5	90 55 25	"	971
" " Adam Cove		0 10 0	90 50 0	"	971
" " Sullivan Bay		0 17 5	90 39 5	"	971
Jervis Island; summit		0 25 0	90 47 30	"	972
Duncan Island; centre hill		0 36 30	90 45 0	"	972
Indefatigable Island; N.W. Bay, Eden Islet		0 33 25	90 37 45	"	972
Barrington Island; W. summit		0 50 30	90 10 0	"	973
Charles Island; Post Office Bay		1 15 25	90 31 30	"	973
" " Summit		1 19 0	90 32 0	"	973
Hood's Island; E. summit		1 25 0	89 43 55	"	974
" " Gardner Bay		1 22 10	89 44 0	"	974
Mac Gowen Shoal; centre		1 8 30	89 59 30	"	974
Chatham Island; Mount Pitt		0 45 15	89 20 45	"	974
" " Terrapin Road		0 43 30	89 27 0	"	974
" " Stephen's Bay		0 50 0	89 36 45	"	975
" " Freshwater Bay		0 56 25	89 33 25	"	975
XXIX.—MARQUESAS ISLANDS, &c.					
Fetu-Hiva or Madalena; Venus Point, 3,670 feet		10 30 40	138 43 15	Survey by M.	982
Motana, Mobotani, or San Pedro; S.S.E. Point		10 0 40	138 49 30	de Tessan, under	982
La Solide Bank, 10 fms.; S. extr. Tabuata or Santa Christina; Port Madre de Dios, watering place		10 13 0	138 49 0	Capt. Du Petit Thouars, 1838.	982
O-Hiva-ou, or La Dominica; Cape Balguerie		9 56 0	139 9 0	"	982
Fetugu or Hood's I.; 1,180 ft. cen. Uspou or Roepou Island; N. point		9 43 30	138 50 0	"	984
" " Obeliak Island		9 25 0	138 57 45	"	984
		9 21 0	140 5 0	"	985
		9 29 30	140 4 45	"	985

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Uahuga, Washington, or Riou's Island; Danger Point . . .		8 54 0	139 33 30	Survey by M. de	986
Nuka Hiva; Cape Martin . . .		8 58 0	140 2 0	Tessan, under Capt.	986
" Comptroller B.; Pt. Haka . . .			140 4 20	Du Petit Thouars.	987
" Pt. A. Maria, or Tai-o-hae . . .		8 55 20	140 6 0	Sir E. Belcher.	—
" Tschitachagoff Point . . .		9 0 0	140 16 0	Krusenstern.	990
" West point . . .		8 54 0	140 19 30	Tessan.	990
" Summit, 3,840 feet . . .		8 54 0	140 11 0	"	987
Motu-iti or Hergest Islet; 130 ft.		8 44 0	140 38 30	"	991
Clark's Reef (?) . . .		8 18 0	139 52 0	"	991
Low Island . . .		7 53 0	140 25 0	"	991
Hiau or Masse Id., 2,000 ft.; S. pt.		8 3 30	140 44 0	"	991
Fattnuhu, Fetou-Houhou, or Chanal Island; N.E. point . . .		7 55 0	140 34 20	"	991
DETACHED ISLANDS BETWEEN THE EQUATOR AND 10° S.					
New York and Nexsen Islands (?)	Fanning.	8 9 0	141 30 0		992
Tiburones (?) . . .		11 0 0	143 0 0	Charts.	992
Caroline Island . . .	Broughton, 1795.	9 57 0	150 25 0	Broughton.	993
Thornton Island (? same) . . .	Thornton.	10 4 0	150 16 0	Thornton.	993
Malden Island . . .	Byron, 1825.	4 0 0	155 0 0	Malden.	993
Starbuck Island (Volunteer Id.) . . .	"	5 58 30	155 58 0	"	993
Penrhyn Island . . .	<i>The Penrhyn</i> , 1788.	9 10 0	157 45 0	Kotzebue.	994
Jarvis Island . . .		0 22 33	159 54 11	Wilkes.	994
Bowditch Island, or Fakaao . . .	U.S. Ex. Ex. 1840.	9 20 0	171 4 0	"	995
D. of Clarence Id., or Nukunono . . .	Edwards, 1791.	9 5 0	171 38 0	"	995
Duke of York Island, or Oatafu . . .	Byron, 1765.	8 25 0	172 27 0	"	995
PHOENIX GROUP:—					
Enderbury's Island . . .		3 8 0	171 14 30	"	996
Birney's Island . . .	Emment.	3 34 15	171 39 0	"	996
Arthur Island (?) . . .		3 30 0	176 0 0	"	996
Gardner or Kemin's Island . . .		4 37 42	174 40 18	Wilkes.	996
M'Kean's Island . . .	U.S. Ex. Ex. 1840.	3 35 10	174 17 26	"	996
Hull's Island, N.W. point . . .	"	4 29 48	172 20 52	"	996
Sydney Island . . .		4 30 0	171 20 0	"	997
ELLICE'S GROUP:—					
Independence Island . . .	Amer. dis.	10 41 0	179 15 0	Bennett.	997
Sophia Island . . .		10 45 0	179 20 0	"	997
Ellice's Group; Fanafute . . .	Peyster, 1819.	8 30 45	179 13 30	Wilkes.	997
Peyster's Group, Nukufetau; N. extremity . . .	"	7 56 11	178 27 32	"	997
Tracy's Island, or Oaitupu; S. pt. . . .	(Reynolds.)	7 30 0	178 56 0	"	998
Lynx or Speiden Island . . .		6 10 0	177 41 0	"	998
Netherlands or Eeg Island . . .	. . . 1825.	7 13 20	177 14 30	Chramtschenko.	998
Gran Cocal Island . . .	Maurelle, 1781.	6 5 0	176 13 0	Duperrey.	998
Sherson's or Hudson Island . . .	<i>The Elizabeth</i> , 1809.	6 19 0	176 23 15	Wilkes.	998
St. Augustine or Taswell's Id. . .	Maurelle, 1781.	5 39 10	176 6 0	Duperrey.	998
Jesus Island (?) . . .	Mendaña, 1567.	6 45 0	171 30 0	"	999
Nameless Island (?) . . .		2 50 0	170 18 0	"	999
Pasnapa or Ocean Id. Var. 12° 25' E. . .	<i>The Ocean</i> , 1804.	0 52 2	168 24 25	Dutailles.	999
Mattoetee or Kennedy's Island . . .	<i>The Nautilus</i> , 1801.	8 36 0	167 50 0	"	999
Pleasant or Shank's Island . . .	Fearn, 1795.	0 25 0	167 5 0	"	1000
XXX:—SALOMON ISLANDS, NEW GUINEA, &c.					
Santa Catalina Island . . .	Mendaña, 1567.	10 53 0	162 30 0	"	1003
Santa Anna Island . . .		10 49 0	162 31 0	D'Urville.	1003
San Christoval Island; C. Surville . . .		10 50 40	162 25 14	"	1003
Iles du Golfe . . .		10 15 0	161 45 40	"	1004
Leoué Bay . . .		10 3 40	161 31 4	Dutailles.	1005
Cape Recherche . . .		10 18 0	161 15 0	D'Urville.	1004
Contrarietés Island . . .		9 51 0	162 0 0	"	1004

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Malayta Island ; Cape Zelée	Mendaña, 1567.	9 45 0	161 39 24	D'Urville.	1006
" " Mount Kolowrat		9 6 30	161 2 24	"	1006
" " Cape Ritters		8 41 0	160 40 0	"	1006
Carteret Island ; Cape Astrolabe		8 21 30	160 37 24	"	1006
Guadalupe Id. ; Islet off E. Cape		9 49 15	160 55 54	D'Entrecasteaux.	1007
" " Cape Henslow		9 59 0	160 39 0	"	1007
" " Cape Hunter		9 49 30	159 57 0	"	1007
" " Island off N.W. side		9 31 38	159 41 39	"	1007
" " Cape l'Esperance		9 16 30	161 46 8	"	1007
Buena Vista Island		8 55 30	160 5 24	D'Urville.	1008
Ysabel Island ; Cape Prieto		8 34 0	159 53 54	"	1008
" " Astrolabe Harbour		8 31 0	159 41 0	"	1009
" " Nairn Island		7 40 0	158 23 0	"	1009
" " Cape Comfort		7 23 40	158 11 24	"	1009
" " Port Praslin		7 25 0	158 20 0	Surville.	1009
Georgia Island ; Cape Pitt		8 53 0	158 14 30	D'Entrecasteaux.	1011
" " Cape Nepean		8 51 30	157 48 45	"	1011
" " Cape Deception		8 42 0	157 30 0	Shortland.	1010
Eddystone Rock		8 18 0	156 30 40	D'Entrecasteaux.	1010
Choiseul Island ; Cape Labé		7 29 5	157 55 20	D'Urville.	1011
" " Cape Alexander		6 42 20	156 32 34	"	1011
" " Choiseul Bay		7 0 0	156 31 0	Bougainville.	1012
Treasure Islands ; S. point		7 28 0	155 29 0	Shortland.	1012
Shortland Island ; Cape Stephens		7 10 0	155 40 0	Bougainville.	1012
Bougainville Id. ; Cape Friendship		6 44 0	155 40 0	"	1012
" " Cape Cras (?)		6 0 0	155 26 0	Shortland.	1013
" " Cape l'Averdi		5 30 0	155 7 14	D'Urville.	1013
Bouka Island ; summit		5 16 0	154 39 0	"	1013
" " Cape North		5 0 30	154 40 10	"	1013
Stewart Island ; Hogan's Island		8 24 24	163 2 0	" 1847.	1014
Inattendus or Gower's Island	Surville, 1767.	7 56 0	160 11 0	Hogun.	1014
Roncador Reefs ; Candelaria	Mendaña, 1567.				
Banks (?)	Maurelle, 1781.	6 17 0	159 14 0	(Krusenstern.)	1014
Bradley Reefs	Hunter, 1791.	6 52 0	161 6 0	Hunter.	1014
Ontong Java Island, or Howe's	Le Maire, 1616.	5 30 0	159 30 0	(Krusenstern.)	1015
Group (?)	Hunter, 1791.				
Mortlock or Massacre Isles	Mortlock, 1795.	4 45 0	157 0 0	Mortlock.	1015
Le Maire and Tasman's Isles	Tasman, 1643.	4 29 0	159 28 0	Wellings.	1015
Frindsbury Reef	1832.	5 0 0	159 19 0	(Horsburgh.)	1015
Simpson's Islands	Simpson.	4 52 0	160 12 0	Simpson.	1015
Marqueen Island	Le Maire, 1616.	4 36 0	156 30 0	Wilkinson.	1015
Cocos Islands	Wilkinson, 1790.				
Nine Islands	Carteret, 1767.	4 53 0	155 20 0	Hunter.	1016
Greene Islands	Le Maire, 1616.	4 50 0	154 12 0	Carteret.	1016
Sir Charles Hardy Island	Carteret, 1767.				
Rennell's Island ; S.E. extremity	Wilkinson, 1790.	11 38 0	160 41 0	Wilkinson.	1017
Indispensable Reef ; S.E. end	"	11 44 0	159 58 0	"	1017
Wells Reef ; E. end	Edwards, 1791.	12 20 0	157 58 0	Edwards.	1017
Pocklington Bank	Pocklington, 1825.	10 53 0	155 30 0	Pocklington.	1017
Laughlan Islands ; E. point	Laughlan, 1812.	9 19 3	153 48 30	D'Urville.	1017
Cannae Island	D'Urville, 1827.	9 19 0	153 30 0	"	1017
Woodlark Island ; E. end	Grimes, 1836.	9 9 0	153 5 0	Hunter.	1017
" " W. end		8 53 0	152 24 0	"	1017
Marshall Bennett Islands ; E. one	Hunter, 1836.	8 50 0	152 0 0	"	1018
Evans Island	" 1841.	9 10 0	151 55 0	Dutailles.	1018
LOUISIAD ARCHIPELAGO.					
Adèle Island	Countance.	11 25 0	154 34 0	D'Urville.	1019
Rossel Island ; Cape Deliverance		11 23 25	154 16 0	"	1019
Renard or Fox Islands ; W. point		10 52 40	152 47 12	"	1019
St. Aignan Island ; Cape Henry		10 41 15	152 45 54	"	1020
De Boyne Island ; N. point		10 39 5	152 22 20	"	1020
La Seinie Islands ; E. one		10 27 30	151 20 24	"	1020
D'Entrecasteaux Ids. ; C. Pierson		9 57 40	151 13 25	"	1020
Well Island ; E. point		9 41 0	150 58 0	"	1021
Cape Labillardière		9 26 0	150 43 0	"	1021

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Cape Denis		8 34 0	151 1 24	"	1021
Riche Island; N. point		8 3 0	147 57 40	D'Entrecasteaux.	1022
Cape Longuerue		7 22 0	147 23 45	D'Urville.	1022
Cape Cretin		6 47 45	147 54 0	D'Entrecasteaux.	1022
NEW IRELAND:—Cape St. George		4 51 0	152 48 14	Duperrey.	1022
Cape Santa Maria		4 15 0	153 7 30	Bougainville.	1022
Slinger's Bay		3 12 0	152 0 0	Dampier.	1024
Cape Byron		2 46 0	150 33 0	Carteret.	1024
Sandwich Island; peak		2 55 0	150 44 0	D'Entrecasteaux.	1024
Duke of York Id.; Pt. Hunter		4 7 30	152 24 0	Duperrey.	1025
Carteret's Harbour		4 42 0	152 44 30	D'Urville.	1025
Gower's Harb., or Port Praslin		4 49 45	152 54 40	Duperrey.	1026
St. John's Island	Tasman.	4 0 0	153 47 0	Bougainville.	1023
Anthony Kaan (or Oraison ?) Id.	"	3 30 0	153 30 0	"	1023
Feod or Abgarris Island; N. point	Renneck, 1826.	3 9 0	154 22 0	Renneck.	1023
Gerrit Denys Island	Tasman.	3 4 0	152 34 0	Bougainville.	1023
Lyra Shoal	Renneck, 1826.	1 53 0	153 28 0	Renneck.	1023
Wishart or Fisher's Island; N. pt.	Le Maire, 1616.	2 32 0	151 54 0	Bougainville.	1024
N. Hanover; Queen Charlotte's Foreland		2 32 0	149 50 0	Carteret.	1024
Portland Islands; W. point		2 38 0	149 29 0	D'Entrecasteaux.	1024
NEW BRITAIN:—Cape Stephens		4 4 0	151 32 0	"	1027
Cape Palliser		4 19 0	152 9 0	Carteret.	1027
Entrance Point		4 52 0	152 15 0	D'Urville.	1027
Cape Orford		5 24 0	152 4 0	"	1028
Quay Peak		5 37 0	151 47 0	"	1028
Port Montagu		6 10 0	150 30 0	"	1028
Cape South		6 30 0	149 48 0	"	1029
Cape Anne		5 40 0	148 17 2	"	1030
Cape Gloucester		5 28 0	148 23 0	"	1030
Cape Lambert		4 12 0	151 41 0	D'Entrecasteaux.	1032
Merite Island		4 54 0	149 5 0	"	1032
Willauze Island; S. point		5 15 3	149 58 10	"	1032
Admiralty Islands; La Vandola		2 14 0	148 10 16	"	1033
Los Reyes Island		1 59 0	148 2 0	"	1033
Jesus Maria Island; S.E. point		2 22 0	147 48 0	"	1033
Admiralty Island; Los Negros		1 58 50	147 16 50	"	1033
Elizabeth Island		2 55 0	146 49 0	Bristow.	1034
Purdy Isles; Mole Island	Bristow, 1817.	2 51 0	146 15 0	"	1034
Sherburne Shoal; S.E. point	White, 1824.	3 15 0	148 16 0	White.	1034
Circular Reef	Renneck, 1825.	3 18 0	147 40 0	Renneck.	1034
Sydney Shoal	Forrest, 1806.	3 20 0	146 50 0	Forrest.	1035
Albert Reef	" 1842.	3 57 0	148 10 0	Charts.	1035
Victoria Reef	" 1842.	4 16 0	147 57 0	"	1035
Gippe Island	" 1842.	4 16 0	149 4 0	"	1035
Squally, Kerué, or Tench Island (?)	Tasman (?)	1 39 0	150 30 0	Ball.	1031
St. Matthias or Fr. Wm. Henry I.	"	1 32 0	149 30 0	"	1031
Anachorètes Island	Bougainville, 1768.	0 54 0	145 30 0	Bougainville.	1035
Commerson Island	"	0 45 0	145 17 0	"	1035
Los Monjos Island	Maurelle, 1781.	0 57 0	145 41 0	Maurelle.	1035
Boudeuse Island	Bougainville, 1768.	1 26 0	144 34 0	Bougainville.	1035
L'Echiquier Island; S. point	"	1 40 30	144 3 0	D'Entrecasteaux.	1035
Los Eremitanos	Maurelle, 1781.	1 28 30	145 7 45	"	1035
Matty Island	Carteret, 1767.	1 33 40	143 12 30	"	1035
Durour Island	"	1 46 0	142 56 0	"	1035
Tiger Island	Bristow, 1817.	1 45 0	142 30 0	Bristow.	1035
NEW GUINEA, NORTH COAST.					
Dampier Strait; Volcano Island		5 32 20	148 17 0	D'Urville.	1030
Rook Island; Cape King		5 29 0	147 46 0	"	1031
Tupinier Island		5 26 0	148 4 0	"	1031
Lottin, or Rocky Island		5 20 0	147 36 0	"	1036
Long Island; Reaumur Peak		5 16 0	147 6 0	"	1036
Crown Island		5 15 0	147 20 0	"	1036

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Cape Croisilles		4 55 0	145 49 0	"	1037
Sir R. Rich's Island		4 49 0	146 13 0	"	1037
Dampier Island		4 40 0	145 58 0	"	1037
Franklin Bay		4 28 30	145 22 0	"	1037
Vulcan Island		4 6 0	145 1 0	"	1037
Aris Island		4 0 0	144 57 0	"	1037
Cape Della Torre		3 51 0	144 31 0	"	1038
Schouten Islands; Lesson Island.		3 35 0	144 48 0	"	1038
Garnot Island		3 30 0	144 35 0	"	1038
Jacquinot Island		3 24 0	144 24 0	"	1038
Deblois Island		3 21 0	144 9 0	"	1038
Roissy Island		3 12 0	144 3 0	"	1038
D'Urville Island; W. end		3 20 5	143 31 15	"	1038
Guilbert Island		3 13 0	143 17 0	"	1039
Bertrand Island		3 10 0	143 10 0	"	1039
Sainson Island		3 8 0	142 25 0	"	1040
Attack Cove		2 40 0	141 14 0	"	1040
Mount Bougainville		2 40 0	140 52 0	"	1040
Humboldt Bay; Pt. Bonpland		2 37 0	140 45 0	"	1040
Cyclops Mountain		2 31 0	140 30 0	"	1040
Matterer Bay		2 21 0	139 58 0	"	1041
Point Brama		2 18 0	139 52 0	"	1041
Mount Benoist (inland)		2 43 0	139 46 0	"	1041
Mérat Island		2 0 0	139 11 0	"	1041
Amable, Mount		2 9 0	139 0 0	"	1041
Arimoa Islands; N. Island		1 37 0	138 41 0	"	1043
Point D'Urville		1 24 0	137 47 0	"	1043
Point Geelwink		1 54 0	137 5 0	"	1043
PORT DORR or DORY (Obs.)		0 51 43	133 59 52	D'Urville.	1044

XXXI.—ISLANDS BETWEEN
THE EQUATOR AND LAT.
10° NORTH.

		Lat. North.	Lon. West.		
Malpelo Island		4 0 0	81 32 0	Colnett.	1046
Rivadeneira Shoal	Rivadeneira, 1842.	4 15 0	85 10 0	Rivadeneira.	1046
Cocos Island; Chatham Bay Obs. Var. 8° 24' E. (1838)		5 32 57	86 58 22	Sir E. Belcher.	1046
Walker's Island	Walker, 1814.	3 34 0	149 15 0	Walker.	1048
Christmas Island; S.E. point	Cook, 1777.	1 40 34	157 13 53	Scott.	1049
Washington Island	Fanning, 1798.	4 41 35	160 15 37	Wilkes.	1050
Fanning's Island	"	3 53 0	158 23 0	Tromelin.	1050
Palmyra Island	Sawle, 1802.	5 50 0	162 23 0	Sawle.	1051
Samarang Isles; W. islet	Scott, 1840.	4 55 9	162 22 20	Scott.	1051
GILBERT ARCHIPELAGO.					
Arurai, Arore, or Hurd's Island	The Elizabeth, 1810.	Lat. South.	Lon. East.	Dutailis.	1054
Byron Island	Byron, 1765.	2 40 54	174 40 49	Byron.	1054
Onoutou or Rotch Island	Clerk.	1 18 0	177 45 0	Clerk.	1055
Maria or Peru Island	"	2 30 0	176 10 0	"	1055
Tamana or Phœbe Island	"	1 0 0	176 0 0	"	1055
Tsputeouea or Bishop or Drummond Island	"	0 15 0	176 45 0	Reynolds.	1055
Nanouti or Sydenham Island	Bishop, 1789.	1 20 0	174 57 0	Wilkes.	1055
	"	0 36 0	174 24 0	"	1057
Nanouki or Henderville Island	Marshall, 1788.	Lat. North.			
Kuria or Woodle's Island	"	0 11 0	173 39 20	"	1058
Apamama or Hopper Island	"	0 14 30	173 27 0	"	1058
Maiana or Hall's Island	"	0 27 21	173 57 30	"	1059
Tarawa or Knoy Island	The Elizabeth, 1809 (?)	0 56 45	173 4 15	"	1059
Maraki or Matthew's Island	Marshall, 1788.	1 29 0	173 5 0	"	1060
Apia or Charlotte Island	"	2 0 0	173 25 30	"	1060
Taritari or Touching Island; S. point	"	1 52 0	173 2 0	"	1061
Makin or Pitt Island; N. point	"	3 8 0	172 48 0	"	1062
	"	3 20 43	172 57 0	"	1062

TABLE OF POSITIONS.

	Discoverer.	Lat. North.	Lon. East.	Authority.	Page.
MARSHALL ARCHIPELAGO.					
Mulgrave or Mille Islands; anch. Var. 9° 45' E.	Marshall, 1788.	6 14 37	171 56 6	Dutailis.	1063
Arrowsmith or Meduro Islands	"	7 5 0	171 23 54	Chramtschenko.	1064
Daniel Island; E. point	"	7 27 0	172 7 0	Marshall.	1065
Pedder Island; W. point	"	7 10 0	171 46 0	"	1065
Aur or Ibbetson Islands; anch. Var. 11° 58' 30" E.	"	8 18 42	171 10 7	Kotzebue.	1065
Kaven or Calvert Ids.; Kaven Id. Egerup or Bishop Junction Island; S. point	Marshall, 1788.	8 54 21	170 49 0	"	1065
Otdia or Romanzoff Ids.; Christ- mas Harb. Var. 11° 38' 30"; high water, 2h. 30'; range, 7 ft. Legiep or Count Heiden Islands; N.W. point	"	9 6 0	170 4 0	"	1065
Temo or Steep-to Island	"	9 28 9	170 16 5	"	1066
Miadi or New Year Island	Kotzebue, 1817.	10 3 40	169 1 57	"	1066
Ailu or Tindal and Watts Island; Capenur Island	Bishop.	9 58 0	169 45 0	"	1067
Tagai or Souworoff Is. Var. 11° 18' E. Bigar or Dawson Island	Kotzebue, 1817.	10 8 27	170 55 34	"	1067
Bigini or Pescadore Islands	Marshall, 1788.	10 17 25	169 59 20	"	1067
Radokala or Rimaki-Korakoff Ids. Udia-Milai or Eschscholtz Islands Shanz Islands	"	11 11 20	169 50 37	"	1067
Kwadelen or Catharine Islands Lydia or Lileb Islands	"	11 48 0	170 7 0	Marshall.	1068
Margaretta or Paterson Islands Tebut Island	Wallis, 1767 (?)	11 19 21	167 24 57	Kotzebue.	1068
Namou or Odia, or Muskillo Group; N. island	Kotzebue, 1817.	11 26 45	167 14 20	"	1068
Helut or Elmore Islands; S. Id. Namureck or Hunter Island	" 1825.	11 40 0	166 24 25	"	1069
Ebon or Baring Ids. Var. 10° E. Boston or Covel Islands	Shanz, 1835.	10 5 0	166 4 0	Shanz.	1069
	<i>The Ocean</i> , 1804.	9 14 0	167 2 0	"	1069
	"	9 4 0	165 58 0	"	1069
	"	8 55 48	167 42 0	"	1069
	"	8 25 0	168 17 0	"	1069
	Bond, 1792.	8 10 0	168 0 0	Chramtschenko.	1069
	<i>The Elizabeth</i> .	7 15 0	168 46 0	"	1070
	Dennet.	5 46 0	169 0 0	Dennet.	1070
	Bond, 1792.	5 35 0	168 13 0	Bond (?)	1070
	Ray, 1824.	4 39 0	168 50 0	Hagemeister.	1071
XXXII.—THE CAROLINE ARCHIPELAGO.					
Ualan or Strong's Island; Coquille Harbour	Crozer, 1804.	5 21 20	163 1 0	Duperrey.	1076
" " " centre	"	5 19 0	163 6 0	Lütke.	1076
Mac Askill Islands; N. one	Musgrave, 1793 (?)	6 12 50	160 47 20	Duperrey.	1076
Duperrey Isles; Aoura, N.E. point Séniavine Ids.; Pouynipète Id.; Roan Kiddi Harb. Var. 9° 45' E.; high water, 6h.; range, 4½ feet " Andema Group; S. extr. " Pagenema Group; Ka- penoar Id.; W. point	Duperrey, 1824.	6 41 45	159 50 0	"	1077
Ngaryk or Valentines Ids.; E. extr. Nougouore or Monteverde Islands; East point	Lütke, 1828.	6 48 0	158 26 0	Rosamel, 1840.	1080
Bordelaise Island	"	6 43 10	158 5 30	Lütke.	1083
Dunkin's Island (?)	"	7 4 40	167 56 30	"	1084
Raphael Island	"	7 47 30	157 32 0	"	1084
Louasappe or D'Urville Island	Tompson, 1773.	5 47 30	157 32 0	"	1084
Mortlock Isles; Lougounor, Port Chamisso	Monteverde, 1806.	3 51 0	155 0 54	D'Urville.	1085
Namolouk Group; N.W. isle	Saliz, 1826.	7 39 0	155 5 0	Saliz.	1085
Hogoleu or Rouk Islands; Pise Id. " " Givry Island	Dunkin, 1824.	9 50 0	154 10 0	Dunkin.	1086
" " Tsia Id.; N.W. pt. Hall Islands; Mourileu Island	Monteverde, 1806.	7 18 0	153 54 0	Duperrey.	1086
Lütke or East Faieou Island	Duperrey, 1824.	7 3 40	152 42 20	"	1086
Namonouito Group; Piserarr Id.	Mortlock, 1793.	5 29 20	153 58 0	Lütke.	1086
	Lütke.	5 55 0	153 13 30	"	1088
	Duperrey, 1824.	7 42 30	151 49 15	Duperrey.	1088
	"	7 9 0	151 51 45	"	1088
	"	7 18 25	151 48 29	D'Urville.	1088
	Hall.	8 47 30	152 20 0	Lütke.	1089
	Lütke.	8 33 20	151 26 0	"	1090
	Ibargoitia, 1801.	8 34 20	152 32 30	"	1090

TABLE OF POSITIONS.

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	Discoverer.	Lat. North.	Lon. East.	Authority.	Page.
Mannajee Bank (?)	Torres.	8° 20' 0"	149° 0' 0"		1091
Los Martires Islands	Duperrey, 1824.	7° 34' 0"	149° 29' 0"	Duperrey.	1091
Enderby Islands; Alet Island	Renneck, 1826.	7° 19' 25"	149° 17' 0"	Freycinet.	1091
Poulousouk or Ibargoitia Island	Ibargoitia, 1799.	6° 35' 0"	148° 22' 0"	(The <i>Nalad</i> .)	1091
Pygbella or Coquille Islet	Duperrey, 1824.	8° 12' 0"	147° 41' 30"	Duperrey.	1091
Faïou Islet	Torres.	8° 7' 30"	146° 47' 30"	"	1091
Lydia Islet (?)		8° 38' 0"	147° 10' 0"	"	1092
Setuhal or Tucker Island	Wilson, 1793.	7° 22' 0"	117° 6' 0"	Duperrey.	1092
Namurrek or Swede Islands	"	7° 32' 0"	146° 30' 0"	Lütke.	1092
" Elato Island	"	7° 30' 0"	146° 15' 0"	"	1092
Olimarao Isles	Lütke, 1828.	7° 43' 30"	145° 56' 45"	"	1092
Ifalouk or Wilson Islands	Wilson, 1793.			"	1092
Onleai Group; N. extremity	"	7° 22' 6"	143° 57' 53"	"	1093
" Raour Id.; E. ex.	"			"	
Var. 2° 25' E.	"	7° 20' 7"	143° 53' 0"	"	1093
Farroilap Island	Lütke, 1828.	8° 36' 0"	144° 36' 0"	"	1094
Eourypyg Islands, or Kama Islands. Var. 3° 40' E.	Hunter, 1791.	6° 40' 0"	143° 10' 0"	"	1094
Sorol or Philip Islands	"	8° 6' 0"	140° 52' 0"	"	1094
Fey's or Tromelin Island	Tromelin, 1828.	9° 47' 0"	140° 38' 0"	"	1095
Ouluthy or Mackenzie Is; Egoi, E. ex. Var. 2° E.	"	10° 7' 53"	139° 54' 58"	Wilkes.	1095
" Mogmog Island	"	10° 6' 0"	139° 45' 30"	Lütke.	1095
Yap or Esp or Unawb Id.; N. pt.	Hunter, 1791.	9° 37' 25"	138° 7' 50"	D'Urville.	1096
Hunter's Reef	"	9° 57' 30"	138° 13' 0"	Hunter.	1096
Matelotas Islands; N. extremity	Villalobos, 1545.	8° 41' 0"	137° 40' 0"	"	1096
Pelew Islands; Kyangle Isles	"	8° 8' 0"	134° 17' 0"	Douglas.	1097
Babelthouap Island; E. extr.	"	7° 41' 0"	134° 40' 0"	MacLuer, &c.	1099
Oroolong Id.; Errakong Harb.	"	7° 11' 0"	134° 21' 0"	"	1100
Pelelew Island; S. point	"	7° 2' 0"	133° 18' 8"	D'Urville.	1101
Angour or Niaur Id.; S.W. pt.	"	6° 53' 55"	134° 5' 24"	"	1101
XXXIII. — ISLANDS BETWEEN LATITUDES 10° AND 20° N.					
Clipperton Island; rock	Clipperton, 1705.	10° 17' 0"	Lon. West. 109° 10' 0"	Sir E. Belcher.	1102
Passion Rock	Dubocage, 17—.	17° 11' 0"	106° 21' 0"	Naut. Mag. 1848.	1103
REVILLA GIGEDO ISLANDS:—					
Socorro or S. Tomas; Braithwaite Bay, landing place		18° 43' 14"	110° 54' 15"	Sir E. Belcher.	1103
St. Benedicto or Nublada Id.; N. end	Villalobos, 1542.	19° 22' 40"	110° 44' 0"	Colnett.	1105
Roca Partida	"	19° 4' 30"	112° 4' 0"	"	1105
Santa Rosa or Clarion Island; Sulphur Bay	"	18° 20' 36"	114° 40' 19"	Sir E. Belcher.	1105
Johnston Islands; N.W. islet	Johnston, 1807.	16° 48' 0"	169° 45' 36"	Wilkes.	1106
Smyth Island; centre	Smyth, 1807.	14° 30' 30"	168° 42' 15"	Smyth.	1106
Wakes Island	Wake, 1796.	19° 10' 54"	166° 31' 30"	Wilkes.	1107
San Bartolomeo Island (?)	Salazar, 1536.	15° 10' 0"	163° 43' 0"	"	1107
Mannel Rodriguez Reef (?)	"	11° 0' 0"	141° 17' 0"	Espinosa.	1107
MARIANA OF LADRONE ISLANDS:—					
GUAM or GUAHAN ISLAND; Umata Bay; church		13° 17' 44"	144° 39' 0"	D'Urville.	1111
Point Faepi		13° 19' 50"	144° 37' 30"	Freycinet.	1111
Port San Luis d' Apra; Fort Santa Cruz		13° 25' 45"	144° 39' 27"	"	1112
Point Ritidian		12° 38' 54"	144° 51' 39"	"	1113
Tarofoto Harbour		13° 18' 9"	144° 35' 56"	"	1113
Abayan Point		13° 14' 0"	144° 43' 40"	"	1114
Santa Rosa Shoal (p. d.)		12° 30' 0"	144° 15' 0"	Charts.	1114
Rota Island		14° 9' 0"	145° 16' 30"	Freycinet and Malaspina.	1114
Aguijan Island; centre		14° 53' 44"	145° 30' 1"	"	1115
Tinian Island; Anson's Road, vill.		14° 59' 22"	145° 36' 19"	"	1116
Saypan Island		15° 14' 30"	145° 43' 0"	"	1117
Farallon de Medinilla		16° 0' 0"	146° 0' 0"	"	1118

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Anatazan Island		16 20 0	145 39 0	Freycinet and Ma-	1118
Guguan Island		17 35 30	145 50 30	laspina.	1118
Alamaguan Island		18 5 0	145 49 0	"	1119
Pagon Island; N. point		18 16 30	145 47 30	"	1119
Grigan Island; N. point		18 50 36	145 37 30	"	1119
Mangs Island		19 32 0	145 20 30	"	1119
Asuncion Island; 2,026 feet		19 41 0	145 27 0	Beechey.	1119
Uraccas Islands		20 0 0	143 25 0	Freycinet.	1120
Guy Rock, or Farallon de Pazaros	Douglas, 1789.	20 30 0	145 32 0	Douglas.	1120
Lindsay Island	Lindsay, 1848.	19 20 0	141 15 0	Lindsay.	1120
XXXIV.—SANDWICH ISLANDS, &c.					
HAWAII; Kapoho Point		19 34 0	154 54 30		1126
Nanavalie		19 38 0	154 57 0	U.S. Ex. Ex. 1841.	1126
Hilo, Waiakea, or Byron's Bay;					
Cocoa Nut Island		19 43 51	155 3 0	Lt. Malden, R.N.	1126
Laupahoi		19 54 0	155 6 0	U.S. Ex. Ex. 1841.	1129
Mauna Kea Volcano		19 54 0	155 28 0	"	1125
Upolu Point		20 19 30	155 58 30	"	1129
Towaihai or Kawaihae		20 2 20	155 55 30	"	1130
Mauna Huahali		19 44 0	155 55 0	"	1126
Kailau or Kairua Bay; N.W. pt.		19 39 0	156 5 30	"	1132
Karakakooa Bay; Tamehameha's					
tomb		19 28 30	156 0 0	"	1133
" " Cook's Monu-					
ment (1° 59' 55" E. of Honolulu)		19 28 0	156 55 5	Thompson, 1837.	1133
Mauna Loa Volcano; Pendulum Pk.		19 28 0	155 35 0	U. S. Ex. Ex.	1126
Peli Point		19 3 20	156 3 0	"	1134
South Point		18 54 0	155 45 0	"	1134
Kilauea Volcano		19 25 0	155 21 0	"	1126
MAUI; Hana Point		20 40 0	156 3 0	"	1135
" Mauna Haleakala		20 42 0	156 18 0	"	1136
" Ulumalu Point		20 55 0	156 18 0	"	1136
" Wailuku (Isthmus); N. side		20 55 0	156 28 0	"	1136
" Laihana		20 53 0	156 42 0	"	1136
" Kamalea Bay; N.W. pt.		20 45 0	156 31 0	"	1137
Molokini Island		20 37 0	156 30 0	"	1137
Kahoolawe; S.E. point		20 33 0	156 32 0	"	1137
" Kealaikahiki, or W. pt.		20 31 30	156 43 0	"	1138
Lanai Island; Cape Kamaiki		20 42 0	156 57 0	"	1138
" " Point Kaena		20 57 0	157 7 0	"	1138
Molokai; Halawa, or E. point		21 9 0	156 45 0	"	1139
" Kalaau, or W. point		21 6 0	157 18 0	"	1139
OAHU; Cape Makapua		21 20 0	157 39 0	"	1139
" Punaleu or Kahuku Point		21 43 0	158 0 0	"	1139
" Waimea Bay		21 39 0	158 4 0	"	1140
" Kaena Point		21 36 0	158 15 0	"	1140
" HONOLULU; wharf		21 18 0	157 55 0	} Raper. } Beechey.	1141
KAUAI or Atooi; Kaloa Point			157 58 0		
" Waimea Bay		21 48 0	159 28 30	U. S. Ex. Ex.	1144
" Point Mana or Kolo		21 56 0	159 43 0	"	1145
" Hanalei or Halelea B.; vill.		22 4 0	159 53 30	"	1146
Niihau or Oneow; Kawaihoa Pt.		22 14 0	159 31 0	Sir E. Belcher.	1146
" " Oku Point		21 45 0	160 17 0	U. S. Ex. Ex.	1146
" "		22 0 0	160 48 30	"	1147
Lehua Island or Oreehoua Island		22 2 0	160 9 0	"	1147
Kaula or Tahooru		21 39 0	160 35 0	"	1147
Papappa Rock (?)		21 30 0	161 18 0	"	1147
Bird Island	Douglas, 1789.	23 5 0	161 45 0	"	1147
Necker Isle	La Pérouse, 1786.	23 34 0	164 39 50	Dagelet, &c.	1147
ISLANDS AND SHOALS NORTH OF LAT. 20° N.					
Los Alijos Rocks	Marquina, 1791.	24 57 25	115 45 20	Du Petit Thouars.	1148
Guadalupe Island; W. islet	"	28 54 0	118 20 0	Vancouver.	1148

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Reed Rocks	Reed, 1850.	37 44 0	137 47 0	Reed.	1149
French Frigates Shoal; Islet	La Pérouse, 1786.	23 45 0	165 50 0	Dagelet.	1149
Gardner Island	Allen, 1820.	25 3 0	168 1 30	Stanikowitch.	1149
Two Brothers Reef(?)	Allen, 1820.	24 14 0	168 30 0W	Stanikowitch.	1149
Maro Reef	Allen, 1820.	25 46 9	171 49 0E	Stanikowitch.	1149
Laysan or Moller Island	American discovery.	25 46 0	171 49 0W	"	1150
Bunker's Island	1815.	28 20 0	172 30 0	Kotzebue.	1150
Lisiansky Island	Lisiansky, 1805.	26 2 48	173 42 30	Lisiansky.	1150
Delaware Bank	Hunt.	27 26 0	174 25 0	Hunt.	1151
Pearl and Hermes Reef; N.E. ex.		27 49 0	175 57 0	Stanikowitch.	1151
Curé Island	American discovery.	28 27 0	178 23 30	"	1151
Krusenstern's Rock	Lisiansky, 1805.	22 15 0	175 37 0W	Lisiansky.	1152
Patrocinio or Byers' Island (p. d.)	Zipiani, 1799.	28 9 0	175 48 0E	Zipiani (?)	1152
Morrell Island	Morrell, 1825.	29 57 0	174 31 0	Morrell.	1152
Crespo Island	Crespo, 1801.	32 46 0	170 10 0	Crespo.	1152
Lot's Wife, or Rica de Oro	Meares, 1788.	29 50 0	142 23 0	Meares.	1153
Marshall (or Jardines) Islands	Marshall, 1788.	21 40 0	151 35 0	Marshall.	1153
Margaret (or Malabrigos) Islands	Magoe, 1773.	27 20 0	145 45 0	Magoe.	1153
Grampus Islands	Meares, 1788.	25 40 0	146 40 0	"	1153
Forfana Island (p. d.)	1543.	25 34 0	143 0 0	"	1154
Volcano Islands; San Augustino.	Torres, 1543.	24 14 0	141 20 0	Krusenstern.	1154
" " Sulphur Island		24 48 0	141 13 0	King.	1154
" " S. Alessandro, or N. I.		25 14 0	141 11 0	"	1154
Arzobispo (or Bonin) Islands	Beechey, 1827.	27 45 0	142 7 0	Beechey.	1155
" Parry's Group; N. rock		27 31 0	142 12 0	"	1155
" Kater Id.; N. rock		27 2 0	142 10 0	"	1155
" Peel's Island; S.W. islet		27 5 35	142 11 31	"	1156
" Pt. Lloyd; Ten Fm. Hole		28 30 0	142 13 0	"	1156
" Bailey Island; S. islet (?)		31 27 0	145 40 0	(?)	1157
San Mateo; Moor Id.; or Sylph Rk.		30 30 30	140 15 0	Ponafidin and Povalichin.	1157
Ponafidin or St. Peter's Island	Ponafidin, 1820.	27 15 0	139 25 0	"	1157
Rosario or Disappointment Id.		20 37 0	136 10 0	Douglas.	1157
Douglas Reef, or Parece Vela	Douglas, 1789.	20 15 0	136 54 0	Bishop.	1157
Nautilus Rocks, or Vela	Bishop, 1796.	25 20 0	131 15 0	"	1158
Bishop Rocks	" 1807.	24 26 40	130 40 0	"	1158
Rasa Island	Kendrick.	24 35 0	134 0 0	Kendrick.	1158
Kendrick Island (Rasa ?)	Ponafidin, 1820.	25 56 0	131 15 0	Ponafidin.	1158
Borodino Isles	M'Michael.	27 50 0	129 5 0	"	1158
Montauk Island (?)		28 22 0	129 50 0	March, 1850.	1158
Crown Island		28 28 0	129 28 0	"	1158
Harbour Island		28 35 0	129 18 0	"	1158
Bungalow Island; E. end		28 44 0	129 38 0	"	—
" " N.W. point	March, 1850.	29 26 0	129 28 0	"	—
Sandon Rocks; 20 ft.	"	28 50 0	129 5 0	"	—
Pinnacle Island	"	29 7 0	129 16 0	"	—
High Island	"	29 1 0	129 7 0	"	—
Roy Island	"				
Peaked Island	"				
XXXV.—THE CORAL SEA, AUSTRALIA, &c.					
Farquhar Group; W. end	Tregrosse, 1821.	17 39 0	151 27 0	Tregrosse.	1160
Vine Shoal	Vine.	17 45 0	151 40 0	Vine.	1160
Libou Shoal	Libou, 1823.	17 25 0	151 45 0	Libou.	1161
Tregrosse Islets; W. one	Tregrosse.	17 42 0	150 43 0	Tregrosse.	1161
Simpson's Reef		16 52 0	149 50 0	Simpson.	1161
Osprey Shoal	1844.	14 42 0	146 30 0	"	1161
Bougainville's Shoals	Bougainville, 1768.	15 17 0	147 57 0	Bougainville.	1161
Diana Banks	Bougainville.	15 41 0	150 25 0	"	1161
Mellish Banks and Kays; centre	Bristow, 1812.	17 16 0	156 12 0	Bristow.	1161
Alert Shoal	Brodie, 1817.	17 2 0	151 49 0	Brodie.	1161
Bampton Shoal; Avon Isles	1793.	19 30 0	158 10 0	"	1161
David Reef		19 20 0	151 0 0	Charts.	1161

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Horseshoe Shoal	Vine.	20 5 0	151 50 0	Vine.	1161
Frederick Reef	1812.	20 45 0	154 15 0	1812.	1161
Minerva Shoal	1818.	20 41 0	159 30 0	1818.	1161
Booby Shoal	Ball, 1790.	21 2 0	159 2 0	Ball.	1161
Ball Shoal	"	21 0 0	160 36 0	"	1161
Bellona Shoal	1793.	20 54 0	159 47 0	1793.	1162
Welsh Bank	"	21 15 0	153 56 0	King.	1162
Kenn's Reef	Kenn, 1824.	21 9 0	155 9 0	Kenn.	1162
Saumarez Shoals; N. extremity .	Lihou, 1823.	21 35 30	153 46 0	Lihou.	1162
Midday Reef; W. end	Carns, 1818.	21 52 0	154 20 0	Carns.	1162
Wreck Reef	1803.	22 11 0	155 19 0	Flinders.	1162
Australia Reef	Slight, 1824.	22 45 0	156 6 0	Slight.	1162
Cato Bank; 32 fathoms	1803.	24 14 51	159 18 15	1803.	1162
Grimes Shoal	1825.	23 53 0	165 0 0	Grimes.	1162
Hamond Island	"	22 30 0	162 51 0	Hamond.	1163
Tamar Reef	"	21 21 0	161 36 0	"	1163
A Shoal	"	20 5 0	160 30 0	Simpson.	1163
New Shoal	"	20 55 0	160 28 0	"	1163
Middleton Island	"	27 58 0	159 30 0	Purdy.	1163
Middleton Shoals	"	29 10 0	158 22 0	"	1163
Eliza Reef	1831.	29 30 0	158 30 0	"	1163
Seringapatam and Elizabeth Shoal	1820.	30 5 0	159 0 0	"	1163
Favourite Shoal (?)	"	26 6 0	160 0 0	"	1163
Lord Howe's Is.; islet off N.E. end	Ball, 1788.	31 22 35	159 14 0	Bethune.	1163
Ball's Pyramid; visible 12 leag.	"	31 43 0	159 24 0	"	1164
COAST OF AUSTRALIA.					
Sandy Cape	"	24 42 0	153 20 0	Flinders.	1164
Great Sandy Island; Indian Head	Cook, 1770.	25 1 0	153 26 0	"	1164
Gardner Bank (?)	"	25 25 0	154 0 0	"	1164
Cape Moreton	"	27 1 0	153 30 0	"	1164
Cape Byron	"	28 38 0	153 40 0	"	1164
Mount Warning; 3,300 feet	"	28 24 0	153 15 0	"	1164
Shoal Bay; entrance	"	29 26 0	153 24 0	"	1164
Smoky Cape	"	30 56 0	153 6 0	"	1164
Three Brothers Hills; E. one	"	31 42 0	152 47 0	"	1164
Port Macquarie; entrance	"	31 25 0	152 57 0	"	1165
Port Stephens	"	32 27 0	152 12 0	"	1165
Port Hunter; Newcastle court-ho	"	32 55 50	151 48 30	"	1165
Broken Bay; S. head	"	33 34 0	151 20 0	"	1165
Port Jackson; lighthouse	"	33 51 11	151 18 12	"	1165
SYDNEY; Fort Macquarie	"	33 51 40	151 14 0	"	1165
PARAMATTA Observatory	"	33 48 40	151 1 0	Brisbane, &c.	1167
Botany Bay; Cape Banks	"	34 0 0	151 16 0	Flinders.	1167
Jervis Bay; Point Perpendicular	Bowen, 1791.	35 6 28	151 2 0	Jefferys.	1167
Cape George	"	35 10 0	150 59 0	Flinders.	1167
Cape Dromedary	"	36 18 0	150 13 0	"	1167
Twofold Bay; Point Brierly	"	37 6 40	149 57 42	Stokes.	1167
Cape Howe	"	37 30 0	150 0 0	"	1167
Gabo Island, lighthouse	"	37 35 0	149 56 0	"	1167
BASS'S STRAIT; Kent Id., lighth.	"	39 29 0	147 17 0	"	1168
Banks Strait; Swan Id., lighthouse	"	40 44 0	148 9 0	"	1168
VAN DIEMEN'S LAND; Eddystone	"	40 59 0	148 22 0	"	1168
Point	"	41 39 0	148 30 0	"	1168
St. Helen's Point; island off	"	42 25 0	148 3 0	Flinders.	1168
Maria Island; pyramid	"	43 12 0	148 0 0	"	1168
Cape Pillar; Tasman's Id. off	"	43 32 0	147 21 0	"	1168
Tasman's Head	"	43 28 45	147 8 0	Frankland.	1169
Bruny Island; lighthouse	"	"	"	"	"
HOBARTON; Sullivan Cove, Fort	"	"	"	"	"
Mulgrave	"	42 53 35	147 21 30	"	1169

SECTION III.

THE ISLANDS OF THE PACIFIC OCEAN.

HAVING in the previous pages described the immense coast line which bounds the Great Ocean on the East and North, we come to a far different order of features in the "cloud of islands" which are distributed over the wide expanse of water which separates the eastern and western world.

Before commencing this task, it will be better for the casual reader of these pages to dismiss from his mind any notions of the magnitude and extent of the land which thus dots the surface of the Pacific that may be gathered from the representations of them. An ordinary chart or map, particularly on a small scale, gives a very imperfect idea of the actual relative sizes of the greater part of these singular natural features. The necessary exaggeration of the scale of the minute but important specks in such a representation would greatly mislead. Another point, too, is that the names attached to these islands adds to their apparent magnitude; and thus, what is in reality but a mere point on the ocean—scarcely discernible at a few miles' distance—becomes, in appearance, on the chart of as much importance as a spot very many times greater in magnitude. As an example, the Caroline Archipelago, which makes such a formidable array of land and names, extending over 27° of longitude, would not, if all the land composing its various groups, with the exception of the two islands which are volcanic, cover a greater surface than is occupied by St. Petersburg and its suburbs. This remark will equally apply to the whole of the Coral groups, which are the distinguishing features of the great world of waters.

The islands of the Pacific are to be separated, generally, into two classes, those of coral structure, and those of volcanic formation. In a later part of this work we will give the distinctive feature of these two great classes of islands. It is a subject which has received very much attention from the naturalists of the present day, and in the foremost rank of this honourable array stands the name of Charles Darwin, Esq., who accompanied Capt. FitzRoy in the *Adventure* and *Beagle* during their arduous services. Some outline will be given of this gentleman's views on the Volcanic and Coral Groups of the Pacific. Another prominent name is that of Jas. D. Dana, Esq., who accompanied the United States' Exploring Expedition under Lieut. Wilkes. It is needless here to dilate on these points; they will be referred to in their proper place.

The order that has been chosen for the accompanying of these descriptions

differs in some points from that followed by Admiral Krusenstern in his invaluable work, and to which, it cannot be too often repeated here, we owe so much in our pages. In the *Memoires Hydrographiques* the islands and shoals are described in the order of their longitudes in the South and in the North portions of the Pacific. In this work, on the other hand, the islands and shoals have been arranged in zones of latitude, which arrangement is presumed to be simple and easy of reference, and more readily understood.

To these prefatory remarks may be added, that they commence with the southern land and proceed westward, and thus extend the northward in the same order.

The separate islands of a group will all be given under the head of the group to which they belong ; but detached islands, or those not depending upon any other, will be given in separate sentences.

One important point in these regions of shoals and detached specks of land is the amount of accuracy with which their position has been ascertained and transferred to our charts. This is very various : in many cases whole degrees remain in doubt ; in others we may suppose that much less than a mile is the utmost amount of variation from the truth. It would be impossible to give a synopsis of this : attached to the notice of each island is generally some remark as to the accuracy of the position given ; but, in general, all the older observers have been found to err greatly from the truth. Many ships, furnished with instruments and chronometers of the first order, have traversed the Pacific Ocean of late years, and have furnished a series of stations, so to speak, from which the seamen with inferior equipments may do great service to navigation by measuring from. In too many instances it is owing to the use of separate and independent observations, which are necessarily made at considerable intervals, thus opening a chance for the multiplicity of error, that so much confusion has arisen in the geography of the Pacific.

With all our knowledge of its different regions, there is still a rich harvest to be gathered, and in one important particular, that of verifying or ascertaining the exact character and locality of older discoveries.

CHAPTER XX.

SOUTH SHETLAND.

THIS inclement country forms a part of the eastern portal of the Pacific. Its discovery has been of great service to the mercantile world, from the vast amount of sealing and other marine produce that was subsequently drawn from it. This pursuit, so eagerly followed, was succeeded by the natural consequence, the diminution of the animals that rendered this knowledge valuable.

For the first notices of the discovery of this archipelago the world is indebted to Mr. William Smith, commander of the brig *Williams*, of Blythe, by whom the land was first seen in the month of February, 1819. The *Williams* was at this time on a voyage from Buenos Ayres to Valparaiso, and stretching far to the South. On the 19th, land or ice was seen in lat. $62^{\circ} 40'$, and near the lon. of 62° W., then bearing S.E. by S. about 2 leagues. Hard gales, with flying showers of snow, and fields of ice, a combination of adverse circumstances, prevented, at this time, an exploration of the coast; and, on the brig's return to the River Plata, in the month of May, similar circumstances prevented any further discovery; but, on a subsequent voyage from Monte Video to Valparaiso, in October of the same year, the *Williams* again made the land. Capt. Smith, in his journal, says:—"I, to my great satisfaction, discovered land on the 15th of October, at 6 P.M., in lat. $62^{\circ} 30'$, and lon. 60° W., by chronometer, bearing distance about 3 leagues; hazy weather; bore up and sailed toward it; at 4 miles' distance sounded in 40 fathoms, fine black sand; an island bearing E. by S. At S.E. by E. bearing, sounded in 60 fathoms, same bottom; hauled off during the night to the northward; at daylight stood in for the land again, at 3 leagues' distance. From the body of the islands sounded again, 95 fathoms, fine sand and oaze; at eight, weather clear and pleasant, saw the main land bearing S.S.E., distance from the islands about 3 leagues. Having run as far as the cape, we found the land trend off to the N.E. Coasting to the eastward, and sounding, found it similar to the former, fine sand. A point bearing E. $\frac{1}{4}$ S., hauled in for it; got the island to bear N.W., distance half a league. Soundings regular from 20 to 35 fathoms, good bottom, sand and gravel. Finding the weather favourable, we down boat, and succeeded in landing: found it barren, and covered with snow. Seals in abundance.

"The boat having returned, which when secured, made sail off shore for the ensuing night; in the morning altered the course so as to keep the land to the southward in view: having doubled the point above mentioned, the land then took a south-easterly direction, varying to the eastward: weather thick and squally, with snow. I thought proper, having property on board, and perhaps deviating from the assurance, to haul off to the westward on my intended voyage. Strong variable winds. Made another cape, and could perceive some high land to the westward of it, and stretching in a S.W. direction. The weather becoming

thick and squally, we made sail to the westward, having sailed 150 miles to the W.S.W. The weather moderating, saw another headland, bearing by observation E.N.E., distance 10 leagues; very high. Observed in lat. $62^{\circ} 53'$ S., and lon., by chronometer, $63^{\circ} 40'$ W. of Greenwich: named this Smith's Cape. Found the land to extend from the cape in a southerly direction. Shaped my course for Valparaiso, where I arrived on the 24th of November, after a passage of sixty days from Monte Video."

Additional information on these lands was subsequently communicated by Capt. Walker, of the ship *John*, of London. This vessel, in 1821, arrived from South Shetland in ninety-eight days, with 12,000 seal-skins, and afterwards returned for another cargo. The *John* was blown off in a gale of wind, and lost two anchors and a cable: the bottom being very rocky, other vessels have met with similar misfortune.

Capt. Cook's description of the Isle Georgia well applies to South Shetland. The country consists of numerous islands, without a vestige of vegetation. A species of moss only is found upon the rocks near the shore; eternal snows covering the more remote parts, which are mountainous. Nature in these regions assumes the most sterile and forbidding features: the thermometer was at no time below the freezing point; but the melting snows near the shore so completely saturate the soil, as to check all vegetation. A species of *coal* was found in abundance, which burnt very well, thus affording the means, if wanted, of replenishing the fuel. The rise and fall of the tide are about 12 feet. Shrimps and penguins beyond all conception numerous. The islands, headlands, &c., have been named, and observations ascertaining the latitude and longitude repeatedly made. Part of an anchor-stock, evidently Spanish, being bolted with copper, and bearing certain marks, was found on shore, and is presumed to be the only vestige now remaining of a 74-gun ship, of that nation, which sailed from Spain, bound to Lima, in 1819, and has not since been heard of.

Several United States' vessels have visited South Shetland; and an American account states that some of the harbours are very good, vessels in them being land-locked. Of the first three months of the year 1821, the mildest experienced there was March; but the seals had mostly retired to the water. A solitary spot or two of something like grass were the only marks of vegetation. No field-ice was seen, but innumerable islands were floating about. The flesh of the young seals was often eaten, and was not disagreeable.

Capt. Dan. W. Clark, of the ship *Hersilia* (an American), reported that he penetrated to the 66th degree of latitude, where he observed lands stretching farther to the South, the extremities of which he could not ascertain. The whole, even in summer, was blocked up with snow and ice, except in particular places frequented by seals.

An early account of South Shetland stated that sperm-whales were seen about the coasts; and it cannot be questioned that such whales may be occasionally here; but we have the authority of Capt. Laurence Frazier for stating, that the whales hereabout are mostly fin-backs.

About twelve months after the first discovery of South Shetland, the British naval commander-in-chief on the South American station directed a further

exploration; and for this purpose a hired brig, the *Slaney*, was sent, under the command of Mr. Edward Bransfield.—“We sailed,” says the reporter, “from Valparaiso on the 20th of December, 1819, but did not arrive on cruising ground till the 16th of January, 1820, having been almost constantly harassed with baffling winds and calms till we arrived in a high southern latitude. On that day, however, we had the good fortune to discover the land to the south-eastward, extending on both bows as far as the eye could reach. At a distance its limits could scarcely be distinguished from the light white clouds which floated on the tops of the mountains. Upon a nearer approach, however, every object became distinct. The whole line of coast appeared high, bold, and rugged; rising abruptly from the sea, in perpendicular snowy cliffs, except here and there where the naked face of a barren black rock showed itself amongst them. In the interior the land, or rather the snow, sloped gradually and gently upward into high hills, which appeared to be situated some miles from the sea. No attempt was made to land here, as the weather became rather threatening, and a dense fog came on, which soon shut everything from our view at more than 100 yards’ distance. A boat had been sent away, in the meantime, to try for anchorage; but they found the coast completely surrounded by dangerous sunken rocks, and the bottom so foul and the water so deep, that it was not thought prudent to go nearer the shore in the brig, especially as it was exposed to almost every wind. The boat brought off some seals and penguins, which had been shot among the rocks; but they reported them to be the only animated objects they had discovered. The latitude of this part of the coast was found to be $62^{\circ} 26' S.$, and its longitude $60^{\circ} 54' W.$ ”

“Three days after this we discovered and anchored in an extensive bay, about 2° farther to the eastward, where we were enabled to land, and examine the country. Words can scarcely be found to describe its barrenness and sterility. Only one small spot of land was discovered on which a landing could be effected upon the main; every other part of the bay being bounded by the same inaccessible cliffs which we had met with before. We landed on a shingle-beach, on which there was a heavy surf beating, and from which a small spring of fresh water ran into the sea. Nothing was to be seen but the rugged surface of barren rocks, upon which myriads of sea-fowls had laid their eggs, and which they were then hatching. These birds were so little accustomed to the sight of any other animal, that, so far as from being intimidated by our approach, they even disputed our landing, and we were obliged forcibly to open a passage for ourselves through them. They consisted principally of four species of the penguin, with albatrosses, gulls, pintadoes, shags, sea-swallows, and a bird about the size and shape of a common pigeon, and of a milk-white plumage—the only species we met with that was not web-footed. We also fell in with a number of the animals described in Anson’s voyage as the sea-lion, and said by him to be so plentiful at Juan Fernandez, many of which we killed. Seals were also pretty numerous; but, though we walked some distance into the country, we could observe no trace either of inhabitants or of any terrestrial animal. It would be impossible for any but beasts of prey to subsist here, as we met with no sort of vegetation, except here and there small patches of stunted grass growing upon the surface of the thick coat of dung which the sea-fowls left in the crevices of the rocks, and a

species of moss, which occasionally we met with adhering to the rocks themselves. In short, we traced the land 9° or 10° East and West, and about 3° North and South, and found its general appearance always the same; high, mountainous, barren, and universally covered with snow, except where the rugged summits of a black rock appeared through it, resembling a small island in the midst of the ocean; but, from the lateness of the season, and the almost constant fogs in which we were enveloped, we could not ascertain whether it formed part of a continent, or was only a group of islands."

A full description of the sea-elephants and seals of these regions, with their peculiar habits, is given by Capt. Weddell in the relation of his voyages, pp. 134—142; in conclusion, he observes:—"The quantity of seals taken off these islands by vessels from different parts, during the years 1821 and 1822, may be computed at 320,000, and the quantity of sea-elephant oil at 940 tons. This valuable animal, the fur-seal, might, by a law similar to that which restrains fishermen in the size of the mesh of their net, have been spared to render 100,000 furs for many years to come. This would have followed from not killing the mothers till the young were able to take the water; and even then only those which appeared to be old, together with a proportion of the males, thereby diminishing their total number, but in slow progression. This system is practised in the River Plata. The system of extermination was, however, practised in Shetland; for whenever a seal reached the beach, of whatever denomination, it was immediately killed, and his skin taken; and by this means, at the end of the second year, the animals became nearly extinct; the young, having lost their mothers when only three or four days old, of course all died, which, at the lowest calculation, exceeded 100,000!"—(Pp. 141-2.)

PARTICULAR DESCRIPTION.—On the 12th of February, 1832, Capt. Biscoe, in the *Tula*, was advancing from the westward, and in lat. $66^{\circ} 27'$, lon. $81^{\circ} 50'$, many birds were seen—albatrosses, penguins, Cape pigeons, &c., with several hump and finned-back whales; and no fewer than 250 ice-islands were counted from the deck. On the 15th land was seen, bearing E.S.E., but at a great distance. Latitude of the ship, $67^{\circ} 1'$, lon. $71^{\circ} 48'$. On the following morning the land was ascertained to be an island, and called *Adelaide Island*, in honour of her Majesty; and, in the course of the ensuing fortnight, it was further made out to be the westernmost of a chain of islands, extending E.N.E. and W.S.W., and fronting a high continuous land, which Capt. Biscoe believes to be of great extent. The range of isles has since been called *Biscoe's Range*.

The main land was named by Capt. Biscoe *Graham's Land*; but it is unquestionably the same which was marked in the old charts by the name of *Gherritz Land*, it having been discovered in 1599 by Dirk Gherritz, of the *Good News* yacht, one of the five Rotterdam ships which doubled Cape Horn, and which he reported to lie in 64° S.*

Adelaide Island is described as having a most beautiful appearance, with one high peak shooting up into the clouds, and occasionally appearing both above and below them, and a lower range of mountains extending about 4 miles from North to South, having only a thin covering of snow on their summits, but

* It is also the *Clarence Land* of Capt. Foster, 1829, who seems not to have been aware that this name had been given to a principal isle of the group to the north-eastward.

toward their base buried in a field of snow and ice of the most dazzling brightness, which slopes down to the water, and terminates in a cliff of 10 or 12 feet high, riven and splintered in every direction to an extent of 200 or 300 yards from its edge. At a distance of 3 miles no bottom could be found with 250 fathoms of line; and around all the islands the water was considerable. One island, in lat. $66^{\circ} 20'$, lon. $66^{\circ} 38'$, has many bays; and forms, with the main land behind, a good harbour for shelter, but the bottom is rocky. No living animal was found on any of these isles, and not many birds, although only a few miles to the northward they were very numerous.

On the 21st of February Capt. Biscoe succeeded in landing on the main land; the highest mountain in view he called *Mount William*, after his Majesty. The place was in a deep bay, in which the water was so still, that could any seals have been found, the vessels could have been easily loaded, as they might have been laid alongside the rocks for the purpose. The depth of water was also considerable, no bottom being found with 20 fathoms of line almost close to the beach; and the sun was so warm that the snow was melted off all the rocks along the water line, which made it more extraordinary that they should be so utterly deserted. The latitude of Mount William appeared, from observation, to be $64^{\circ} 45'$, longitude $63^{\circ} 51'$.

Capt. Biscoe after this repaired to the South Shetland Islands, where he was driven ashore, lost his rudder, and very narrowly escaped shipwreck.

The northern point of what was considered as the main land by Capt. Biscoe was seen by him, at the distance of about 10 leagues, on the 27th of February, 1832; and the appearance of a range of islets, probably eminences on the main, continued in a north-westerly direction to the distance of 10 leagues farther, and not remote from a spot previously visited by the *Chanticleer*, in lat. $63^{\circ} 26'$ S., and lon. $64^{\circ} 6'$ W., January, 1829. To this point Capt. Foster imparted the name of *Cape Possession*, having here taken formal possession in the name of King George the Fourth. The coast, from the cape, takes a south-westerly direction, until lost to the eye on the horizon, where it appears to terminate in a mass of islands, of a bleak and dismal aspect, the same which were afterwards seen by Capt. Biscoe.

Early in the morning of the 5th of January, 1829, H.M.S. *Chanticleer*, from Staten Island, came in sight of *Smith's Island*, the westernmost isle of South Shetland. Fine weather of several preceding days was now succeeded by snow storms, which added not a little to the inhospitable appearance of the island. The vessel was also surrounded by icebergs; but with daylight, and no night, she was enabled to thread her course among them. The island was covered with snow, excepting on the sides of the precipices and the faces of the rocks, where it could not lie; and these, from their black appearance, presented a striking contrast with the high snow-clad land.*

* Capt. Weddell, in his notice of South Shetland, states that he was the first person who landed upon Smith's, by him called James', Island, the highest and most forbidding of all. The summit he estimated to be nearly 2,500 feet above the level of the sea.

This island was seen, as above mentioned, by Capt. Foster, in the *Chanticleer*, who named its summit *Mount Beaufort*, in respect to Capt. Beaufort, R.N., hydrographer to the admiralty, &c.

On the 7th of January, after passing Smith's Island, the *Chanticleer* was coasting, with fine clear weather and a light easterly breeze, the coast called *Trinity Land*, to the southward of South Shetland. It appeared to be of considerable extent, with mountains of 6,000 or 7,000 feet in height, and covered with eternal snow. The day was fine, and numerous whales (fin-backs) were spouting up columns of water, and blowing about in all directions; while flocks of variegated petrels, or pintadoes, were circling around, and sedulously watching these leviathans of the deep for the purpose of obtaining some sort of food or aliment from their slimy exuviae; and penguins innumerable were popping up their heads here and there, skipping and starting out of the water in the full enjoyment of their gambols. From the deck of the *Chanticleer* 84 large icebergs were in sight.

The first chart of these islands, for the use of navigators, was constructed by the late Mr. Geo. Powell, commander of the ship *Dove*, and published by Mr. Laurie in 1822. In the composition of it, exclusive of his own observations and sketches, Mr. Powell was materially assisted by several intelligent commanders, both English and American, and he has added to the islands properly *South Shetland*, another group, considerably more to the East, which he discovered on the 6th of December, 1821. The latter lies between the parallels of $60\frac{1}{4}^{\circ}$ and $60^{\circ} 48'$, and between the meridian of 44° and 47° . About it were innumerable icebergs and ice-islands. These isles appear in the chart under the name of *Powell's Group*, or *South Orkney*, and to the principal isle Mr. Powell imparted the name of *Coronation Island*; but *Pomona*, or *Main Land*, has since been proposed by Mr. Weddell, as a more appropriate name.

Capt. Weddell has given an imperfect sketch of Powell's Group, under the name of *South Orkneys*. These islands he fell in with on the 12th of January, 1823; and he describes their coasts as, if possible, more terrific in appearance than those of South Shetland; the tops of the islands, for the most part, terminating in craggy towering peaks, which look not unlike the mountain tops of a sunken land. The loftiest of these summits, towering up to a point, in a clear day may be seen at the distance of 15 leagues.

By observations made on the 14th, it appeared that Saddle Isle, one of the easternmost islets of the group, lies in lat. $60^{\circ} 37' 50''$, and lon., by mean of three chronometers, $44^{\circ} 52' 45''$. Mr. Powell placed this isle in lat. $60^{\circ} 36' S.$, and lon. $44^{\circ} 32' W.$

Capt. Powell's detail and general remarks accompany the chart above mentioned, under the title of "Notes on South Shetland," and to these Notes is appended a Meteorological Journal of the temperature of the air and water on every day, from the 8th of November, 1821, to the 26th of February, 1822.*

This summit he states to be about 6,600 feet above the level of the sea, and to have been seen at the distance of 85 miles.

Capt. Foster adds, that the position of Mount Beaufort being tolerably well ascertained, may afford to those who, having met with adverse winds off Cape Horn, are compelled to pass its meridian to a high southern latitude, the means of ascertaining their longitude with tolerable precision, either by its bearing when on a known parallel, or by bearings from two stations sufficiently apart for that purpose, and connected by means of a self-registering log; and thus may be obtained the position of the ship.—*Webster*, vol. ii. p. 275.

* Among the names of the commanders who materially assisted in the formation of the chart, we particularly notice those of John Walker, Robert Fildes, Ralph Bond, and Charles Robinson:

WINDS.*—Nearly all the misfortunes that have happened in South Shetland have been in gales of wind from the eastward, which frequently prevail here, and blow with tremendous fury, generally accompanied with heavy falls of snow. No less than seven vessels have been lost, and all with easterly gales, excepting the *Clothier*, an American, which struck on a sunken rock.

In the years 1820, 1821, and 1822, nearly four-fifths of the gales were from the eastward; though we had all looked for harbours sheltered from the westward, being under the impression that we should have most to fear from that quarter.

In fine weather the winds from the S.W. and N.E. are about equal, not keeping long in either quarter. Indeed, with very few exceptions, the winds are always along the land, which renders this coast far less dangerous when under sail than it would otherwise be.

The south-westers here, much like the north-westers at home, are attended with a fine clear sky, and generally sweep away all the fog and sleet of the light north-westers. In two seasons I recollect only one gale from the N.W., which was very heavy. I was then in Blythe Bay, and it was perfectly smooth, though the sea outside was in a manner overwhelming.

It would appear, if a parallel may be drawn from these two seasons, that gales of wind on the land are very infrequent. I have noticed that the wind on the land is generally light, with thick dirty weather; however, the gales of wind after the middle of February begin to increase in strength, and it is then not worth any one's while to stop longer on the coast. Were I bound round Cape Horn, and to meet with adverse winds, I would not keep hugging the wind, and going about with every slant, but check the topsail yards in, and keep my reach to the southward, when I should be sure to be not long without an easterly wind, with which I could soon get sufficient westing (the degrees of longitude being so short), and such an offing from the western part of Tierra del Fuego, as to make for me a S.W. wind a fair one.

The danger of falling in with ice is almost chimerical, there being no low drift ice on the North side of Shetland; and in two seasons I saw only three ice-islands.

TIDES.—The tides on the North coast of South Shetland are very irregular, it being sometimes high water for twenty-four hours together; at others it flows tide and half-tide, and remains for about three or four hours high water, and then ebbs again; though there is, in general, one flood and one ebb every twenty-four hours. Gales of wind raise the tide sometimes much above its natural level; which may account, in some measure, for many skeletons of whales, which lie in many places 12 or 14 feet, at least, above high-water mark, and many yards from the sea-shore. In *Blythe Bay* (Desolation Island) I have frequently noticed an easterly gale to raise the water considerably above its common height; and the brig *Lady Troubridge*, of Liverpool, that drove on shore on Christmas day, 1820, was found, in the next season, forced up nearly high and dry. This was on King George's Island.

Near the mouths of the straits the tides run very strong, and in various directions,

* Remarks by Capt. Robert Fildes, of Liverpool.

which renders the navigation in light winds both unpleasant and unsafe. The flood tide on the coast sets to the eastward.

I have been informed that, when the brig *Williams* was on the survey, they found the current running always strong to the eastward; but as they appear to have taken only a line of coast (it being, without doubt, dangerous for one vessel alone to approach too near), they could not be expected to have had so good an opportunity of experiencing how the tides run in with the land, as those who have been continually passing and repassing in-shore.

In a S.W. gale I have seen the tide run directly to windward, a full league from the coast, at the rate of 2 or 3 knots; and *vice versa*, to the eastward again, when the brig *Williams*, and the ship *Indian*, were at once blown out of Blythe Bay with a gale of wind from the eastward. The *Indian*, which I was on board of, drove 10 leagues to the westward; and the *Williams*, though lying-to, drove up 7 leagues to the eastward, and dead to windward two-thirds of the way; which evidently showed that the two vessels had received the impulse of two contrary streams.

From all the observations which I have been able to make, I think the flood and ebb, in moderate weather, runs backward and forward in the offing as far as 2 leagues from the outer points of the land, taking the sweep of the bays: but, be it understood, that it sometimes runs much longer both ways, and likewise stronger than it does at others. Its distance from the coast also varies outside these limits. I have found the current run at least a knot, in the same direction as the wind blows.

From these remarks it will appear that it is not easy to give any satisfactory account of the tides, so as to reduce them to anything like a regular theory. One circumstance, however, may be worthy of notice;—fragments of the wrecks of the *Cora* and *Clothier* were all invariably drifted to the westward. Cape Shirreff and the North beaches were scattered all over with them, and not a single particle was ever found to the eastward. The *Cora's* were easily identified, being either cedar or mahogany. On the South side of the land it is pretty generally admitted that the motion of the water is, on the contrary, toward the *eastward*, and carrying with it vast quantities of ice, in the direction of the coast, toward Sandwich Land.

In his *General Remarks* Capt. Powell says, "All the northern part of the coasts of South Shetland abound with islets, rocks, and breakers, while the southern coasts are entirely clear of these dangers; but, in the early part of the spring, the southern sides are blocked with ice, which comes from the land to the South of and opposite to it: when you come up as far as the South beaches you again meet with rocks and breakers."

The best harbour is formed by *Deception Island* (lat. $62^{\circ} 56'$, lon. $60^{\circ} 35'$), which island, or *shell* of an island, is certainly one of the most singular productions of nature: the land is high, and bold on every side, with a narrow opening, of about a cable's length, on its S.E. side, leading to a very capacious basin. The isle is a volcanic production; its shores on either side are bold; and pumice-stone, with other substances, indicate its origin. There are several hot-springs, some of which are of a temperature sufficient to boil an egg. The basin is 5 or 6 miles across. At its mouth you will have 3, 4, and 7 fathoms of water,

and increase very rapidly as you enter : from 7 fathoms you increase to 10 ; then 18, 27, 32 ; and then, a little within this, you will get no bottom at 60 fathoms. On the N.W. side of the basin there is a very fine cove, capable of containing several vessels, in about 4 or 5 fathoms of water, and a bottom of good clay. From the entrance of the basin up to the cove the course is N.W. by W.

Deception Island was one of the pendulum stations of the late Capt. Foster, and a copious description of it is given by Mr. Webster, in his vol. i. pp. 144—165 ; and by Capt. Foster, in vol. ii. pp. 277, 280. Its situation, as shown in the Table of Positions, is lat. $62^{\circ} 56'$, lon. $60^{\circ} 35'$;* and from the latter the longitudes of the other islands have been inferred.

The following Remarks on Deception Island, &c., have been given from a journal of the expedition.

“ Among ice-islands in a boisterous sea, attended with fogs, rain, and gales of wind, the little *Chanticleer* had no easy task to get to South Shetland. On the 10th of January, 1829, the Island of Deception was discovered, and a safe anchorage in the *interior* of it was shortly found. This island is justly entitled to its appellation, and is one of the most extraordinary productions of nature. Its formation is entirely volcanic, the principal part being composed of lava, ashes, and ice. The shores rise to an elevation of some hundred feet, particularly on the North side, which is considerably higher than the South ; and being circular, of about 7 miles in diameter, it appears from a distance to be one large mass, from shore to shore. In searching for a harbour to receive the *Chanticleer*, an opening was discovered, about 200 feet wide, on its S.E. side ; and, on further examination, it was soon found that a large circular basin, of about 5 miles diameter, occupied nearly the whole *interior* of the island, the external shores forming a perfect barrier or wall, thereby affording the utmost security within. The depth in the centre of this basin was 97 fathoms, rather too much for anchorage, but a small cove on its eastern side gave ample security to the *Chanticleer*.

“ The pendulum was employed here, and the necessary observations performed, whilst the officers of the *Chanticleer* surveyed and explored this extraordinary island. Several small coves were found on the borders of the basin ; and some stones placed on each other, in a rude, clumsy manner, near one of them, were discovered to have been used by the crews of sealers for the purpose of boiling their oil. Nor were these the only traces of the sealing-vessels ; for, in the exploring expeditions which were constantly going forward, another pile of stones, on a neighbouring eminence, was found, on examination, to contain the corpse of a man. He had evidently been a sailor belonging to one of these vessels, but of what country could not be discovered. There was nothing found near him to indicate how he had died, nor at what date. The stones were carefully replaced, and a notice left on the spot, that his remains might not again be disturbed.

“ The external as well as the internal shores of this island, from the friable

* Messrs. Fildes and Powell make the latitude $63^{\circ} 3'$, while their longitude agrees very nearly with that of Capt. Foster.

nature of its materials, present some very remarkable appearances. The eastern side is entirely faced with cliffs of ice, about 300 feet in height, which the constant washing of the sea forms into singularly fantastic shapes. Similar cliffs are also found on the South and S.W. sides, and their base is bounded by a beach of ashes and lava, which extend round the whole island at low water. The examination of the basin was attended with considerable difficulty, arising from the small ashes and dust which were carried into it from the island. Seals, and their companions, penguins and sea-leopards, were the only inhabitants found in this desolate island, which affords not the slightest verdure. Streams of water, at a temperature of 140° and 160° of Fahrenheit, were found issuing in some places from the sides of the hills, and running into the basin, the water of which was scarcely above the freezing point. It is generally supposed that this basin was formerly the crater of a volcano, and that the sea has found its way into it by washing out the narrow passage by which the *Chanticleer* entered. How long it has been resorted to by sealing-vessels is unknown."

BRIDGMAN'S ISLAND.—Near the centre of the Shetland group is *Bridgman's Isle*, in lat. $62^{\circ} 4'$, lon. $57^{\circ} 0'$, apparently another volcanic production. Capt. Weddell, on passing within 200 yards of it, observed smoke issuing through the fissures of the rock, and apparently with much force. The figure of the island is nearly round; it is very small, but 400 feet in height, partaking of the form of a sugar-loaf.

On advancing from the northward toward *Livingston's* or the *Main Island*, the land will appear in mountains of a vast height, and covered entirely with snow; the base of them terminating in perpendicular ice-cliffs. The whole has an awfully grand, though terrific and desolate, appearance; the snowy mountains showing themselves, one over another, far above the clouds, and exciting in the mind a devotional reverence on the wonders of the Almighty: and even if surrounded on all sides with rocks and breakers, the mind is forced into pious contemplation of the grandeur of the scene.

On this side of the group, in lat. $62^{\circ} 20'$, and lon. $59^{\circ} 45'$, is a small isle, named *Table Island*, which is by far the most remarkable hereabout, and will always be an infallible mark for any one approaching, as it is not possible to mistake it for any other land. All strangers, therefore, should make this their land-fall, particularly in the early part of the season, for then the land is not so easily made out, it having a great quantity of snow upon it, which may, at times, deceive those best acquainted. Its top appears as level as a bowling-green, and its sides resemble a wall. In the upper part of the N.E. end of it is a chink, or division, which from some situations may be seen.

LOUIS PHILIPPE LAND, JOINVILLE LAND, ETC.—To the southward of the South Shetland group is the land discovered by the late Admiral D'Urville, of the French marine, and named by him as above. From a letter, addressed by him to the French minister, contained in the *Bulletin de la Société de Géographie de Paris*, 1838, p. 275, we copy the following notice of his exploration:—*

* A more lengthened account of this exploration is given in the Narrative of the Voyage subsequently published.

"On the 27th of February, 1838, after a long stretch towards the South, through much ice, we came upon these mysterious lands; and in spite of the complicated obstacles against which we had to contend, both on account of the continued bad weather, and from the fog and ice, in the space of about 8 days we succeeded in tracing exactly their outline, for a distance of about 120 miles, between 63° and 64° South latitude. The land, which is crowned with immense peaks,* is covered by continual snows, of unknown depth. Were it not for the blackish rocks, rendered visible by the melting of the snows which form their limits on the coast, one would often be scarcely able to distinguish them from the numerous fields of ice which surround them. The principal of these places has received the name of Louis Philippe Land, in honour of the king, who first conceived the idea of making these explorations towards the South Pole. Other islands have received the names of various persons who have exhibited an active interest in our expedition, more especially of that illustrious statesman who arranged the plan of our voyage. Lastly, the mountains, capes, and islands, will recall the memory of the officers who took part in our dangers."

PETER I. ISLAND.

The Island of the Emperor Peter I. was discovered by Capt. Bellingshausen in Jan. 1821. From the description he has given in his journal it is 8 leagues in circumference. He determined its lat. to be in 68° 57' S., and lon. 90° 46' W. The height of the island is more than 4,000 feet; and the variation of the compass, at the time of its discovery, was ascertained to be 36° 6' easterly. Capt. Bellingshausen's voyage was made in the Russian Imperial ships, *Mirny* and *Vostok*; and the account of it, still in the untranslated Russian language, was published in the year 1819: we can therefore give no further account of this point, or of the next,

ALEXANDER I. LAND,

which was also discovered some days after the previous island, by Capt. Bellingshausen. He determined the North point of this island to be in lat. 68° 51' S., and lon. 73° 9' 46". The ships were prevented by the ice from approaching its southern point, and thus its position could not be determined.

These two detached portions of land may be presumed to form portions of the great southern continent; although the continuity has not been traced, yet certain indications lead to this. The southern part of Graham's Land, that is, the portion of it seen by Capt. Biscoe in February, 1832, from Adelaide Island, is not above 100 miles distant from it, and this again forming a portion of the South Shetland range. The continent may be reasonably traced here through an extent of 250 leagues.

There is also reason to believe that the Islands of Peter I. and Alexander I. are connected by some hitherto undiscovered land; for Capt. Bellingshausen, in his traverse from one to the other, met with several signs of land, as, for example, some birds, which from their formation seemed to be land-birds, and he even

* Mount D'Urville is 3,000 feet high.

perceived a change in the colour of the water. Now although the vacancies remain hitherto unfilled, the recent discoveries of Sir James Ross to the westward in such high latitudes lead to the inference that continuous land exists in those inaccessible regions. This inference has had greater weight since the discoveries recorded in the succeeding paragraphs.

ANTARCTIC LANDS.

On all the early maps of the world we find a *terra australis incognita* marked as surrounding the South Pole. This is one of the most ancient ideas of speculative geography, and its existence was supposed to be necessary to counter-balance the arctic lands. It was not until after the later voyages of Kerguelen, Cook, and others, that it entirely disappeared from our charts. The first of these navigators pushed to the southward, and discovered, in 1772, the island now bearing his name, with the idea of determining its existence.* One of the great objects of the second voyage of our great navigator, Cook, was also the solution of the same problem, as explained in the introduction to the account of that voyage; and with this object Cook penetrated as far as lat. $71^{\circ} 10'$ S. on the meridian of 107° W., but without succeeding in his object. Some slight indications of the existence of land had been seen by him in lat. $61^{\circ} 30'$ S., lon. 95° E. The result of these explorations led to the obliteration of these supposed lands from our representations.

The revival of the ancient speculations in recent times is due to the enterprise of the eminent and spirited merchants, the Messrs. Enderby, of London. A vessel despatched for the southern whale fishery, the brig *Tula*, commanded by Capt. John Biscoe, discovered the coast, lying on the antarctic circle, to the South of Madagascar, and to which the name of the munificent proprietors was attached. This is, however, beyond our present limits, nor have we included the land described in the preceding article, South of Cape Horn, which, as before alluded to, is very probably a portion of a much larger extent of land, perhaps connected with that to be described presently.

Between these southern lands, that is, to the South of Australia, and on and to the South of the antarctic circle, is a range, or *perhaps* a range of coast, the merit of the discovery of which has been the subject of angry disputation. We will give a brief outline of the various points that have entered into this discussion.

In the year 1839, several merchants, at the head of whom were the Messrs. Enderby, had two vessels,—the *Eliza Scott*, under Capt. John Balleny, and the *Sabrina* cutter, under Capt. Freeman, in these seas. On February 9th in that year these two vessels discovered the range of islands called the Balleny Islands; and on March 2nd following, appearances of land were seen by them in lon. 117° E., and named Sabrina Land. This was the first discovery. The next was made nearly simultaneously. On Jan. 1st, 1840, two French vessels quitted Sydney to follow up the magnetic meridian to the southern magnetic pole. These were the corvettes *L'Astrolabe* and *La Zélée*, under the command of Dumont D'Urville. On January 19th M. Vincendon Dumoulin distinctly saw from the

* Relation de Deux Voyages, &c., par M. de Kerguelen, part i., 1782.

masthead of the *Astrolabe* land to the southward. They landed on some rocks on January 21st, taking possession in the name of France. This land was called *Adelie Land* (*Terre Adelie*), from Adèle, the wife of the commander. On January 13th following, the same vessels approached what was considered to be land, though defended by enormous fields of ice. This was named *Clarie Coast* (*Côte Clarie*).

The other claims at this period have obtained an unfortunate notoriety. They are those of the American Exploring Expedition. On Dec. 29th, 1839, that is, two days before the French expedition above-named sailed, four ships under the command of Lieut. (since Capt.) Wilkes, left Sydney on their antarctic cruise. Some land was marked on a chart that was stated to have been seen on Jan. 13th; but in the "Narrative," vol. ii. p. 292, the first claim of discovery advanced is dated on Jan. 16th; but more of these presently. The *first* land incontestably made out by the American vessels was on their landing on it on Jan. 30th, *Adelie Land*, discovered by the French eleven days prior to this. The American ships struggled on to the westward, daily announcing *appearances* of land to the southward, but without anything more tangible, till Feb. 21st, when they bore away to the northward. A chart was drawn up from this cruise, in which Capt. Wilkes says he laid down the land "not only where we actually determined it to exist, but those places in which every appearance denoted its existence;" and a tracing of it was given to Capt. Sir James Ross, who was then on his antarctic expedition in 1840-41.

We have now entered on delicate ground, but justice to all demands that it should be traversed.

The well-known magnetic expedition in H.M.S. *Erebus* and *Terror*, the ships whose unknown fate among the northern ices is at this moment a topic of most intense interest, then under the command of Capt. Sir Jas. Clark Ross and Capt. Crozier, after making their brilliant discovery of the *Victoria Land*, and having the before-mentioned American chart on board, arrived at the very spot where the appearance of land was stated to have been *first* observed by the United States' Expedition, but it all melted into thin air, and after sailing over the space indicated, and sounding 600 fathoms without bottom on the top of the mountains marked by Capt. Wilkes, its non-existence was satisfactorily proved. This was on March 5—7, 1841, and 70 or 80 miles to the N.E. of the *Balleny Islands*.

This discovery naturally threw discredit on the other portions of the statements of Capt. Wilkes, and they were, with other matters, made the subject of a court-martial held on board the U.S.S. *North Carolina*, on the return of the Exploring Expedition. Capt. Sir James Ross has published a fac-simile of Capt. Wilkes's first tracing in his work; and this chart, with the exception of that part disproved, has been also given in the "Narrative of the American Expedition," published three years later, that is, in 1845; and in which narrative these very singular claims of priority and extent of discovery are still repeated, which of course is long subsequent to the period when Capt. Wilkes must have learnt the particulars of *Balleny's* (not *Bellamy's*) and *D'Urville's* *real* claims.

"This confidence in reporting as *real* discoveries lands only *suspected* to exist (we quote M. Biot), has appeared to European navigators most surprising, and

altogether presumptuous. Experience has taught them how fallacious these appearances are, and how little they are to be trusted, especially in the southern seas, and amid the polar ices. The most experienced navigators have taken these ideal lands for realities, and have drawn their outlines, and watched their details, for entire days, after which they have vanished." Sir James Ross gives a curious example of this:—"On Jan. 5, 1841, in lat. $66^{\circ} 55'$, amid the ice, a remarkable appearance of land, which remained for several hours without the slightest change of feature, which many of the officers took to be real land, ranges of hills covered with snow. Yet this, and many other such, was but the appearance of the upper edge of the clouds, which, with a perfectly defined but irregular outline, shows the elevation to which aqueous vapour can ascend in these latitudes. Below this edge the vapour appears in all stages of condensation; above it, the cold and clear atmosphere, into which it cannot rise."* With such facts as these, can it be reasonably doubted, but that many of the *appearances* of land, very indistinctly seen by the United States' Expedition, may not have been equally fallacious? We have, in the succeeding pages, given Capt. Wilkes's account of the land, or what was *presumed* to be land, seen from the ships under his command. On the question of the actual existence of all these various portions of land, we cannot give any opinion. We would merely draw attention to the foregoing fact, that the only portion since examined has been found not to exist.

Now, for the question of priority, Capt. Wilkes lays claim not only to having been the first to discover, but the first to *suspect* the existence of the great southern continent. This is putting out of sight all the old authors, and the explicit object of the voyages of Tasman, Kerguelen, Cook, and others. Complaint is made that other nations, "with what intent I shall not stop to inquire, have seemed disposed to *rob us of the honour* by underrating the importance of their own researches." This is remarkable. Moreover, this sentence was first published *four years* after the question was set at rest. The grand discovery of Sir James Ross, in the succeeding year, does not need to be underrated. Nor can the discovery of Capt. Balleny, in the year previous, be argued away. One other remark relative to the real claims of D'Urville and Wilkes. Capt. Wilkes's first chart would date the first sight of the *apparent* (but not real) land on Jan. 12th or 13th, 1840. In his "Narrative" he claims from Jan. 16th, but at the court-martial some of his own officers averred that the *supposed* land in question was not certainly seen until Jan. 19th, or three days later. Now, it certainly appears very singular that this should be the identical day on which D'Urville saw the real land of Adelie to the westward, a fact not actually established by Wilkes till afterwards, on the same spot, which he subsequently persists in calling Piner's Bay; but this was on Jan. 30th, or eleven days later than D'Urville's. These trifling differences would not have been considered of importance as to rival claims, had they not most unfortunately been magnified into objects of real consideration by the course afterwards pursued.

The order of discovery, then, is summed up in few words. First, Capt. Balleny discovered the islands bearing his name, February 9th, 1839, and the

* Voyage to the South Pole, vol. i. p. 177.

spot which he considered to be land, Sabrina Land, March 2nd, 1839. Next, Capt. D'Urville examined the Land of Adelie from January 19th, 1840, and the supposed Côte Clarie, February 7th, 1840. Third, Commodore Wilkes states that he saw what he *supposed* to be land January 16th, 1840, but did not verify his discovery until June 30th, 1840. Fourth in order is the exploration of the incontestable Victoria Land by Capts. James Clark Ross and Crozier in 1841-42. This will be presently described. It has even been stated that Capt. Wilkes did not put forth his pretensions until after his return to Sydney, on finding that the French had landed on Jan. 22nd on the coast. The outlines of this painful controversy may be gathered from a paper by M. Daussy, in the *Bulletin de la Société de Géographie*, 2nde serie, No. 109. See, also, Sir James Ross's *Account of his Antarctic Voyage*; the *Narrative of the United States' Exploring Expedition*, vol. ii. chap. ix.; some papers by M. Biot, in the *Journal des Savants*, November, 1848, pp. 672—687, and December, 1848, pp. 710—728, &c., &c.

To the general navigator, these regions are of minor importance. In one view they are valuable. It would appear from the relations of D'Urville, Ross, Wilkes, and Balleny, that whales, chiefly of the fin-back species, were met with in some parts in abundance. The peculiarly hazardous nature of the navigation, surrounded by the immense icy obstacles, of course render their pursuit one of no ordinary difficulty. The ever-changing character of the floating icebergs and fields partake of the usual features belonging to it in other regions.

BALLENY ISLANDS.

This is the earliest discovery, and, as before mentioned, was made by Capt. John Balleny in the schooner *Eliza Scott*, of 154 tons, accompanied by the dandy-rigged cutter *Sabrina*, Mr. H. Freeman, master, belonging to Messrs. Enderby, and well equipped for the enterprise. They quitted London July 16th, 1838.

As this group is one of very considerable interest in the history of the antarctic lands, we will extract, with some abbreviations, the account of its discovery:—"February 9th, 1839—At 11^a a.m. noticed a darkish appearance to the S.W., lat. observed, 66° 37' S. At noon saw appearance of land to the S.W., extending from W. to about S.; ran for it, and at 4^a made it out distinctly to be land. At 8^a p.m. got within 5 miles of it, when we saw another piece of land of great height, bearing W. by S. At sunset we made them out to be three separate islands of good size, but the western one the longest. February 10th—At 2^a a.m. bore up for the middle island, and got within half a mile, but found it completely ice-bound, with high perpendicular cliffs. February 11th—At 11^a a.m. the weather cleared; saw the land bearing about W.S.W., and of a tremendous height, I should suppose at least 12,000 feet, and covered with snow. February 12th—At 6^a p.m. went on shore on Young Island, in the cutter's boat, at the only place likely to afford a landing; but when we got close with the boat, it proved only the drawback of the sea, leaving a beach of 3 or 4 feet at most. Capt. Freeman jumped out and got a few stones, but was up to the middle in water. There is no landing or beach on this land; in fact, but for the barren rocks where the icebergs had broken from, we should scarce have known it for

land at first ; but as we stood in for it (Buckle Island), we plainly perceived smoke arising from the mountain tops. It is evidently volcanic, as specimens of stone, or rather cinders (scoriæ and basalt, with crystals of olivine), will prove. The cliffs are perpendicular, and what in all probability would have been valleys and beaches, are occupied by solid blocks of ice. I could not see a beach or harbour, or anything like one."

The group consists of five islands, three large and two small, the highest of which, named *Young Island*, was estimated by Capt. Balleny, as well as by his mates, at 12,000 feet above the sea. It rises in a beautiful peak, which may be called Peak Freeman, as being on the island on which the commander of the cutter *Sabrina* landed. These islands and peaks were named respectively after Messrs. Young, Borradaile, Buckle, Sturge, Brown, Row, and Beale, the spirited merchants who united with Mr. Enderby in sending out the expedition. The easternmost, or *Sturge Island*, rises also to a peak, named *Brown's Peak*, but is not half the height of that on Young Island. Immediately off the centre, or *Borradaile Island*, is a remarkable pinnacle of rock, called *Beale Pinnacle*, which rises like a tall lighthouse from the waters. The westernmost, or *Row Island*, is low, and offers no remarkable feature.*

Another portion of the Balleny group was also seen by Capt. Sir James Ross, March 2, 1841. At first it appeared as two, but on the succeeding day as three islands. The northern one was named *Russell Peak* ; the southernmost, *Smyth Island*, after the president of the Royal Astronomical Society ; and the third was named *Frances Island*.

VICTORIA LAND.

This, the most southern known land, is the discovery of Capt. Sir James Ross and Commodore Francis R. M. Crozier, in January, 1841. The *Erebus* and *Terror*, having quitted Hobart Town on November 12, 1840, proceeded to the Auckland Islands and Campbell Island, and then advanced to the southward to reach the South magnetic pole. On January 11th land was seen ahead, and as the land is best described by Sir James Ross himself, we will quote his narrative.

The land rose in lofty peaks entirely covered with perennial snow ; it could be distinctly traced from S.S.W. to S.E. by S. (by compass), and must have been more than 300 miles distant when first seen.†

The highest mountain of this range I named after Lieut.-Col. Sabine, R.A. It is in lat. $71^{\circ} 42' S.$, lon. $169^{\circ} 55' E.$

At noon we were in the highest latitude ($71^{\circ} 15'$) attained by our great navigator in 1774, during his several attempts to penetrate to the South. We had by this time run 15 leagues directly towards Mount Sabine, and still it appeared to be very distant ; more land came in view as we advanced, mountainous ranges extending to the right and left of that we first discovered. At 6 p.m.,

* Journal of the Royal Geographical Society, vol. ix. 1839, pp. 520—522.

† The northern point seen of the Victoria Land was passed on the return of the vessels in 1841, and was named *Cape North* ; a low point, with three projecting knobs, like the tops of mountains, was seen at a great distance beyond Cape North, whence the land trends considerably to the South of West, but a dense body of ice prevented the following the coast any farther.

when we had closed the land 70 miles, we were about 2 leagues from the shore, which was lined with heavy pack ice. We steered close along the edge of it towards a small bay, where we hoped to effect a landing, but the wind being on the shore, and a high sea beating heavily along the pack edge, we found it quite impracticable. We therefore stood to the S.E., for the purpose of rounding the eastern extreme of a close body of ice, and of getting to the leeward of a projecting point of the coast, off which we observed several small islands, that we expected would afford such protection as to admit of our landing with less difficulty.

The cape which forms the southern promontory of the bay was named *Cape Downshire*, after the late marquis. Its northern point was called *Cape Adair*, after Viscount Adair, lat. $71^{\circ} 18'$, lon. $170^{\circ} 45' E.$ It is a remarkable projection of high, dark, probably volcanic, cliffs, and forms a strong contrast to the rest of the snow-covered coast. Some rocks that were observed to lie several miles to the North and West of Cape Adair, showing their black summits conspicuously amongst the white foam of the breakers, were named *Dunraven Rocks*: we obtained soundings in 165 fathoms, and several small black stones, which came up with the lead, tended to confirm my conjectures of the volcanic origin of the newly discovered land. Cape Adair at the time bore N. $52^{\circ} W.$, distant about 5 or 6 miles. It was a beautiful clear morning, and we had a most enchanting view of the two magnificent ranges of mountains, whose lofty peaks, perfectly covered with eternal snow, rose to elevations varying from 7,000 to 10,000 feet above the level of the ocean. The glaciers that filled the intervening valleys, and which descended from near the mountain summits, projected in many places several miles into the sea, and terminated in lofty perpendicular cliffs. In a few places the rocks broke through their icy covering, by which alone we could be assured that land formed the nucleus of this, to appearance, enormous iceberg. The range of mountains extending to the N.W. was called Admiralty Range, of which the higher and more conspicuous were distinguished by the names of the Lords Commissioners of the Admiralty, *Mounts Minto, Adair, Parker, Troubridge, Pechell*, and *Dalmeny*.

Mount Dalmeny, lat. $71^{\circ} 5' S.$, lon. $167^{\circ} 8' E.$, formed the western extreme of the Admiralty Range, as also the most westernmost land in sight, and was distant from us between 70 and 80 miles. The height of Mount Sabine was found, by means of several measurements, to be rather less than 10,000 feet, and about 30 miles from the coast. The elevation of the other mountains was not determined with accuracy, but we judged them to vary from 7,000 to 9,000 feet; and altogether they presented as grand and magnificent a view as can be imagined. A cape to the westward of Cape Adair, having a deep bay between them, was named after Charles Wood, Esq., First Secretary to the Admiralty; and another cape, still farther to the westward, surmounted by a remarkable conical hill, was distinguished by the name of Sir John Barrow, Bart.

The dip had increased to 86° , and the variation amounted to 44° . These observations place the magnetic pole in lat. $76^{\circ} S.$, lon. $145^{\circ} 20' E.$, therefore in the S.W. (*true*) from us, and distant above 500 miles. But the land interposed an insuperable obstacle to our direct approach to it, and we had to choose

whether we should trace the coast to the N.W., with the hope of turning the western extreme of the land, and thence proceed to the southward ; or follow the southerly coast line round Cape Downshire, and thence take a most westerly course.

The ceremony of taking possession of these newly-discovered lands, in the name of our most gracious sovereign Queen Victoria, was immediately proceeded with.

The island was named *Possession Island*. It is situated in lat. $71^{\circ} 56'$, and lon. $171^{\circ} 7' E.$, composed entirely of igneous rocks, and only accessible on its western side. We saw not the smallest appearance of vegetation, but inconceivable myriads of penguins completely and densely covered the whole surface of the island, along the ledges of the precipices, and even to the summits of the hills, attacking us vigorously as we waded through their ranks, and pecking us with their sharp beaks, disputing possession ; which, together with their loud coarse notes, and the insupportable stench from the deep bed of guano, which had been forming for ages, and which may at some period be valuable to the agriculturists of our Australian colonies, made us glad to get away again, after having loaded our boats with geological specimens and penguins. Owing to the heavy surf on the beach, we could not tell whether the water was ebbing or flowing ; but there was a strong tide running to the South, between Possession Island and the main land, and the *Terror* had some difficulty to avoid being carried by it against the land ice. Future navigators should therefore be on their guard in approaching the coast at this place.

January 14th, 1841, in lat. $71^{\circ} 50'$, and lon. $172^{\circ} 20'$, a great number of whales were observed, thirty were counted at one time in various directions. They were chiefly of large size, and the hunchback kind ; only a few sperm whales were distinguished amongst them ; we observed great quantities of molluscous and other minute marine animals, on which no doubt the whales were feeding ; and large flocks of the young of the Cape pigeon were playing about, and feeding with them.

January 15.—Early this morning we had a fine view of a magnificent chain of mountains that we had seen stretching away to the southward some days before. With a moderate southerly wind we had beautiful clear weather, and we now saw them to great advantage ; and as we stood towards them we gazed with feelings of indescribable delight upon a scene of grandeur and magnificence far beyond anything we had before seen or could have conceived. These mountains were also completely covered to their sharply-pointed summits with snow, and the elevations, that were measured roughly, varied from 12,000 to 14,000 feet. They were named after the eminent philosophers of the Royal Society. *Herschel* was given to the most conspicuous of the mountains ; *Mount Northampton*, *Cape Roget*, and *Cape Christie*, which are formed by the terminations of Mount Herschel and Mount Lloyd, to seaward, to others. Observations placed us at a distance of 90 miles from the mountains, which we still saw so clearly. Mount Herschel subtended an angle with the horizon of $36'$, and might have been seen under equally favourable circumstances at 30 or 40 miles farther off.

January 17.—In the afternoon an unusual degree of refraction was remarked

to the S.W., which had the effect of bringing, at times, clearly into view land we had not before seen. This land having been thus discovered at a distance of more than 100 miles, I gave the name *Cape Anne* to the extreme southern point, and the land afterwards proving to be an island, was named *Coulman Island*.

January 19.—At four o'clock in the morning we had 170 fathoms; at eight, 210 fathoms; and at noon the depth of water increased to 270 fathoms, although we had closed the land more than 40 miles since midnight. Coulman Island, which we had only seen by refraction, now formed the southern extreme point in view, and a new range of mountains was observed stretching away to the S.W. from Mount Northampton, forming a kind of crescent-shaped ridge. A remarkable conical mountain to the North of Mount Northampton was named *Harcourt*; another, *Mount Lubbock*, to the southward of Mount Brewster; and two other mountains still farther to the southward, *Murchison* and *Phillips*. Making all sail to the South, steering direct for Coulman Island, which still formed the eastern extreme of land in sight, having abroad passage between it and the main land, a deepbight was observed to the southward of a remarkable cape, high, black, and cloven at the top; farther to the North, *Cape Wheatstone*, the right-hand point of an apparent inlet, had the whole of its precipitous face quite clear of snow, though it thickly covered its rounded summit. Soon afterwards we received that the ice extended from the North cape of Coulman Island (*Cape Wadworth*) several miles to the northward, and the whole space between it and Cape Jones was filled with a solid field of ice that appeared as if it had not broken up this season. We sounded in 320 fathoms, the deep sea clams coming up full of a stiff green mud, sand, and small stones, some fragments of star fish, and pieces of coral. A strong ripple indicated a tide or current; and we found the ship was drifting to the South, by the lead and bearings of the land, at the rate of three-quarters of a mile per hour. At this time Cape Anne, the extreme point of Coulman Island, bore W.N.W. 25 miles. We stood to S.W. to close the main land; when close in with the main pack we could observe the land ice stretching round to the southward, a firm unbroken mass, with a considerable quantity of loose ice off its edge.

We tacked and stood off to the eastward, to wait for clear weather; and on standing in again land was distinctly seen; a high peaked mountain, bearing true West, was named *Monteagle*; and one of very great elevation, the highest by estimation we had yet seen, was named *Mount Melbourne*, the form of which had a general and striking resemblance to Mount Etna, but its elevation must be very much greater. The land ice, although not more than 4 or 5 feet above the surface, blends so imperceptibly with the snow that descends from the mountains, and extends far into the sea, that it was impossible to form any idea of the exact position of the coast line. To the N.W. the space between Coulman Island and the main land was occupied by a similar kind of land ice, that appeared not to have been broken away for many years; in this particular more resembling the barrier described by Lieut. Wilkes, as extending from the shores of the lands discovered by him near the antarctic circle.

This icy barrier proved a sufficient obstacle to any attempt to reach the magnetic pole,

In their farther progress to the southward, that is, to the South and East of Coulman Island, they had seen but very few whales, which was the more remarkable on account of the very great numbers they met with not more than 60 or 70 miles to the northward.

Franklin Island, which was reached January 27th, is in lat. $78^{\circ} 6' S.$, and lon. $168^{\circ} 12' E.$ It is 12 miles long and 6 broad; the northern side presents a line of dark, precipitous cliffs, 500 or 600 feet high; not the smallest trace of vegetation was visible—not a lichen or piece of sea-weed on the rocks. A high cliff of ice projects into the sea on its South and West sides, and renders it there quite inaccessible; and a dangerous reef of rocks extends from its South cape 4 or 5 miles. We stood to the southward close to some land which had been seen since the preceding noon, and had then been called High Island; it proved to be a mountain, 12,367 feet high, emitting flame and smoke in great profusion. The discovery of an active volcano, in so high a southern latitude, cannot but be esteemed a circumstance of great geological importance and interest: I named it *Mount Erebus*, lat. $77^{\circ} 33' S.$, lon. $166^{\circ} 58' E.$; and an extinct volcano to the eastward, little inferior in height, being by measurement 10,884 feet, was called *Mount Terror*.

The seat of the southern magnetic pole, upon which it was the most anxious wish of the commander to plant a flag, as he had done on that in the northern hemisphere, must be in some very lofty mountain to the westward of this portion of the vessels' tracks. The coast in front of them, for they were very distant, was not seen. They were named the *Prince Albert Mountains*.

A small high round island, which had been in sight all the morning, was named *Beaufort Island* (lat. $76^{\circ} 55' S.$, lon. $166^{\circ} 58' E.$), after the great hydrographer. At the foot of these two volcanoes the only two conspicuous headlands are separated by a bay of inconsiderable depth. The western promontory was called *Cape Bird*; the easternmost, *Cape Crozier*; after the officers and esteemed friends of the commander. To the eastward of Cape Crozier a remarkable vertical wall of ice extended from 150 to 200 feet high, over which some distant mountains could be seen extending to the South from Mount Terror, and named *Parry Mountains*. Along this solid and impenetrable barrier they sailed to the eastward. From its height above the surface it must have been more than 1,000 feet in thickness; and this immersion had a most magical effect in quieting the undulations of the sea. On February 2nd they attained the highest latitude gained that season, $78^{\circ} 4' S.$, and 250 miles from Cape Crozier. In the next season this mighty barrier was traced for above 450 miles distant from the same point, maintaining the same unvarying character.

We will conclude this most imperfect series of extracts on this interesting region with the following remarks of Capt. Ross:—"I have no doubt but that these seas, in the summer season, might be penetrated to a great distance; and it is very probable that eventually the South magnetic pole will be attained by persevering to the S.W. through the vast track of ocean which separates Victoria Land from the Balleny and other islands or lands, discovered near the antarctic circle, by Biscoe, Balleny, Wilkes, and D'Urville. We saw a great many whales whenever we came near the pack edge, chiefly of a very large size;

and I have no doubt that, before long, this place will be the frequent resort of our whaling ships, being at so convenient a distance from Van Diemen's Land, which affords every means and facilities for their equipment; and thus we may hope to become, by degrees, through their exertions and enterprise, better acquainted with this part of the antarctic region, which the setting in of the winter so much earlier than we expected had prevented our accomplishing so satisfactorily as we wished."*

ADELIE, CLARIE, SABRINA LANDS, ETC.

We again return to the northward, and then proceed to the westward along the line of the icy barrier, which has been passed by the English, the French, and the American navigators, as described in the introductory remarks to this section of our work. Within this barrier lies the continent, or land, which has been the subject of so much disputation. We shall not again enter into this, but briefly extract what each navigator has said concerning his progress, and this beginning first to the westward of the Balleny Islands.

Ringgold's Knoll is the first discovery which is claimed in the "Narrative" for the United States' squadron, vol. ii. p. 292. This, it is there stated, was made on January 16, 1840.† They saw "over the field ice an object, large, dark, and rounding, resembling a mountain in the distance; the icebergs were all light and brilliant, and in great contrast."—"The mountains could be distinctly seen, over the field ice and bergs, stretching to the S.W. as far as anything could be discerned. Two peaks, in particular, were very distinct, named *Eld* and *Reynolds' Peaks*, rising in a conical form, but whose summits were lost in light fleecy clouds. The sun shone brightly on ridge after ridge, whose sides were partially bare; these connected the eminences I have just spoken of, which must be from 1,000 to 2,000 feet high."

Cape Hudson was seen by the *Peacock* January 19, 1840, far beyond and towering above an ice island that was from 150 to 200 feet in height. It bore from them about S.W., and had the appearance of being 3,000 feet in height, forming a sort of amphitheatre, looking gray and dark, and divided into two distinct ridges or elevations throughout its entire extent, the whole being covered with snow. To the West of it was an inlet into the main body of the ice, named *Peacock's Bay*, into which the vessel penetrated. Off its West Point, called *Point Emmons* on Wilkes's chart, the *Vincennes* passed a remarkable collection of tabular icebergs, for whose existence they could account for in no other manner than by supposing them to be attached to a rocky islet which formed a nucleus to which they adhered. It was quite obvious that they had not been formed in the place where they were seen, and must, therefore, have grounded after being adrift. To the West of this group again a deep indentation was called *Disappointment Bay*, in lat. $67^{\circ} 4' 30''$ S., lon. $147^{\circ} 30'$ E. *Piners' Bay*, to the westward of this again, was made to be in lat. $66^{\circ} 45'$ S., and lon. $140^{\circ} 2' 30''$ E. Here the ships approached within half a mile of the dark volcanic rocks, which appeared on both sides of them, and saw the land gradually rising beyond

* *Voyage of Discovery, &c.*, vol. i. p. 265-6.

† But see the remarks on p. 665.

the ice to the height of 3,000 feet, and entirely covered with snow. It could be distinctly seen extending to the East and West fully 60 miles. Some on board pointed out the appearance of smoke, but the commander was of opinion that this was nothing but the snow drift, caused by the heavy squalls. This was on January 30th. During the traverse along the land described to the eastward, the ships were very frequently exposed to the most imminent danger from the tempestuous weather, and the innumerable icebergs. Although no mention whatever is made in the American narrative of the fact, this Piner's Bay must have been the same land as that *landed on* by the French on January 21st previously.

ADELIE LAND.—On December 12, 1839, two French corvettes, the *Astrolabe* and *Zélée*, with their crews sadly reduced, and in a deplorable state of health, cast anchor at Hobart Town. They had left Toulon under Dumont D'Urville and Jacquinot on September 7th, 1837. After a short respite, they again started on their perilous enterprises, and sailing due southward by compass, on the 19th of January they descried land, but caution led them to defer judgment until the 20th, when all doubts were dispelled. During this day the ships remained nearly stationary, and without wind, surrounded by icebergs, without the power of avoiding them. On the 21st a breeze sprung up, which carried them toward the new land, but they were arrested by the perpendicular icy wall, towering far above the masthead, and barring farther access to its shores. They, however, gained a basin free from ice, and saw the land not more than 3 or 4 miles distant. It extended from N.E. to S.W., and beyond the limits of vision. It was from 3,500 to 4,000 feet in height, entirely covered with snow, which shewed in ridges like the sands of the desert. No part of the ground was visible, and only its great elevation was an evidence that it was not a vast bank of clouds. During the close examination of the interesting land, the summits of some black pointed rocks were perceived; this was the signal for the boats to advance, and they accordingly landed from both ships, and took possession January 21st, 1840. The land was named by Capt. D'Urville after his wife, *Terre Adélie*. The following days they were engaged in examining its details, but on the 23rd a breeze sprung up, which placed them in the greatest danger, to which the almost neutralized power of the compasses added not a little. However, they escaped from the dangerous labyrinth. On the 29th a sail was perceived, which, by its colours, was seen to be an American man-of-war; it was the United States' exploring ship the *Porpoise*: and then occurred the incident which has been so differently related by the two commanders. The ships passed without speaking to each other; perhaps it so best suited the American. We have before alluded to the particulars of this discovery.

The western part of Adélie Land, or rather that connecting it with Clarie Coast, which was passed by the United States' Expedition in the first days of February, is described by the commodore to be bounded by icy cliffs, from 150 to 200 feet in height, quite perpendicular, without any appearance of rocks, and entirely covered with snow. There was no break visible in this icy barrier, and the land, still continuing to trend to the westward, exhibited the same character as before.

Cape Carr, of Capt. Wilkes, where the barrier and the land appear to trend suddenly to the southward, was found to be in lon. $131^{\circ} 40' E.$, and lat. $64^{\circ} 49' S.$ This cape is the Côte Clarie seen by Commander D'Urville on the 30th January previous, who therefore claims the merit of priority.

CLARIE COAST (Côte Clarie) was inferred to exist by D'Urville from induction only. On his approach, January 30th, 1840, he states that before him was an immense wall of ice, continuous, without fissures, and from 100 to 150 feet in height; he coasted along it for 20 or 25 leagues, without finding a termination. From being so close to these icy cliffs he was unable to see if there was land beyond them. They only presented the fact from which it might be presumed that this boundary of ice, so solid and so extensive, could not be formed and maintained with such continuity, without resting against some great land. This supposition is never expressed but with this reserve; and in his chart of 1840, D'Urville marks it as "ice cliffs, steep and uniform, *supposed* to envelop a solid base." The French did *not* land on it as stated by Capt. Wilkes.—(Vol. ii. p. 282.)

Porpoise Bay, of the United States' Expedition, is said to be West of Côte Clarie, as no land could be seen in a South direction. *North's High Land* was distinctly visible, though distant. *Totten's High Land*, a continuation of the same, was very indistinctly seen February 10th, 1840. This must form a portion of that discovered by the English commander, John Balleny, on March 2nd, in the previous year.

SABRINA LAND, the part under consideration, was thus named by Capt. Balleny after the cutter which accompanied his vessel. His journal says: "March 1st, 1839:—Standing to the westward, passed several icebergs and numerous flocks of penguins, petrels, and mutton-birds. March 2nd:—Strong winds; saw a great many birds. At noon, lat. obs. $64^{\circ} 58'$, lon. $121^{\circ} 8' E.$ At 8 p.m., the water becoming smooth all at once, hove to. *Saw land to the southward*, the vessel surrounded by drift ice. March 3rd, a.m.:—Found ourselves surrounded by icebergs of immense size; to the S.W. the ice was quite fast, with every appearance of land at the back of it; but the weather coming on thick, were obliged to steer to the northward along the edge of the pack. At noon, lat. obs. $65^{\circ} 10'$, lon. $117^{\circ} 4'."$ *

Knox's High Land, of Wilkes, was approached on February 14th, 1840. The lon. at noon was $106^{\circ} 18' 42''$, lat. $65^{\circ} 59' 40'' S.$; variation, $57^{\circ} 5' W.$ The extent of coast in sight was 75 miles, and, by approximate measurement, 3,000 feet high. It was entirely covered with snow. On running in for the land, several icebergs, greatly discoloured with earth, were passed, and they landed on one of the largest. In it were imbedded, in places, boulders, stones, gravel, sand, and mud or clay. The larger specimens were of red sandstone and

* Journal of the Royal Geographical Society, 1839, vol. ix. p. 525. Commodore Wilkes states that the land which he names *Budd's High Land*, lying to the westward of that portion seen by Capt. Balleny, was distinctly seen from the *Vincennes*, from 18 to 20 miles distant, bearing from S.S.E. to S.W., a lofty mountain range, covered with snow, though showing many ridges and indentations. The lon. observed was $112^{\circ} 16' 12'' E.$, and the lat. $64^{\circ} 57' S.$, which puts the supposed land in about $65^{\circ} 20' S.$, and its trending nearly East and West.

basalt. There was no doubt but that it had been detached from the land about 8 miles distant.

The *Vincennes* then coasted along the icy barrier to the N.W. and West, passing a vast number of whales and sea-birds on and around all the icebergs. The western extreme attained was in a large bay in the barrier, which was named *Repulse Bay*, lon. $97^{\circ} 37'$ E., and lat. $64^{\circ} 1'$ S.; var., decreasing, $56^{\circ} 21'$ W. Appearances of land were also seen to the S.W., and its trending seemed to be to the northward. It is called *Termination Land* on the American chart. Hence the barrier trends to the northward, and was not traced to the westward by the United States' Expedition. But it may be observed, that Capt. Cook found the ice and evidences of land in about lat. $61^{\circ} 30'$ S., lon. 95° E., in February, 1773.

This concludes the description of the lands, which may be properly said to form the southern bounds of the Pacific. From the field its discovery may have opened to our whale-fishers, and the great interest attached to it in a scientific light, it certainly is most important, and deserves a larger notice. Since the occupation of the Auckland Islands by our spirited merchants, with the express intent of following this branch of commerce, we may ere long obtain a more complete knowledge of the region; the more especially when it is remembered that the gentleman, to whose public spirit we are indebted for our earliest knowledge of its existence, is himself on the spot to direct these important operations.

Before concluding these remarks, we give an extract from the Narrative by Capt. Wilkes:—"The evidence that an extensive continent lies within the icy barrier must appear in the account of my proceedings, but will be, I think, *more forcibly* exhibited by a comparison with the aspect of other lands in the same southern parallel. Palmer's Land, for instance, which is in like manner invested with ice, is so at certain seasons of the year only, while at others it is quite clear, because strong currents prevail there, which sweep the ice off to the N.E. Along the antarctic continent, for the whole distance explored (by the United States' Expedition), which is upwards of 1,500 miles, no open strait is found. The coast, where the ice permitted approach, was found enveloped with a perpendicular barrier, in some cases unbroken for 50 miles. If there was only a chain of islands, the outline of the ice would undoubtedly be of another form; and it is scarcely to be conceived that so long a chain could extend so nearly in the same parallel of latitude. The land has none of the abruptness of termination that the islands of high southern latitudes exhibit; and I am satisfied that it exists in one uninterrupted line of coast from Ringgold's Knoll in the East, to Enderby's Land in the West; that the coast (at lon. 95° E.) trends to the North, and this will account for the icy barrier existing, with little alteration, when it was seen by Cook in 1773. The vast number of ice islands conclusively points out that there is some extensive nucleus which retains them in their position; for I can see no reason why the ice should not be disengaged from islands, if they were such, as happens in all other cases in like latitudes. The formation of the coast is different from what would probably be found near islands, soundings

being obtained in comparatively shoal water; and the colour of the water also indicates that it is not, like other southern lands, abrupt and precipitous. This cause is sufficient to retain the huge masses of ice, by being attached by their lower surfaces instead of the sides only."

The ICES that are met with here have been alluded to, and we have not space to dilate on the subject.

The observations of the United States' squadron during their antarctic cruise, January and February, 1840, together with those of the preceding year, would seem to confirm the opinion, that very little change takes place in the line of ice. It may be inferred that the line of perpetual congelation exists in a lower latitude in some parts of the southern hemisphere than in others. The icy barrier retreats several degrees to the South of the antarctic circle to the West of Cape Horn, while to the eastward it in places advances to the northward of that line, which is no doubt owing to the situation of the land. From the great quantities of ice to be found drifting in all parts of the ocean, in high southern latitudes, they were induced to believe that the formation of ice islands is much more rapid than is generally supposed.*

DETACHED ISLANDS SOUTH OF LATITUDE 40° S.

Between the western coast of South America and New Zealand, and the vast groups of coral islands forming the Low Archipelago, and other similar collections of minute spots of dry land to the North, and the eternal ices which enclose the land or the sea about the South Pole, we have an immense expanse of ocean, in which, as far as has been hitherto discovered, no portion of the earth's surface rises above the level of the waters: so that the mariner, in traversing this immense extent, comprising more than 110° of longitude, and 45° of latitude, has no fixed point to direct him as to his exact position, other than those drawn from the heavens. The only group stated to exist, that were discovered by the *Nimrod*, seems to be of somewhat doubtful character.

In proceeding from the eastward, it is not until we reach the vicinity of New Zealand that we encounter any lands; and these consist of a series of small isolated rocky groups, which are arranged in a general N.E. and S.W. direction, rearing their rugged peaks to some height, but at considerable intervals from each other. Upon reference to the chart it will be seen that they form a line of islands parallel to the general trend of the New Zealand ranges of mountains, and also the principal mountain ranges of New South Wales. There may be some connection between these conformities, and the character of their geological formation tends to the same conclusion. Most, if not all, of these islands are of volcanic formation. New Zealand is eminently so, as will be shown hereafter. With this view it may be considered that, should any fresh discoveries be made,

* Narrative of the U. S. Exploring Expedition, vol. ii. p. 329.

they will lie in this general line. From these waters being now so much traversed, however, this is scarcely probable now.

Following the principle we have set out with, we commence with the southernmost and easternmost of the groups.

NIMROD ISLANDS.

A group of islands stated to have been seen by Capt. Henry Eilbech, in the ship *Nimrod*, in 1828, on her passage from Port Jackson to Rio Janeiro, round Cape Horn. They were placed by him in lat. $56\frac{1}{2}^{\circ}$ S., and lon. $158^{\circ} 30'$ W., and appear to have been seen at a considerable distance; although numerous birds and amphibious animals, with a great quantity of marine vegetables found in the vicinity, indicated their real existence.*

Capt. Biscoe sought for the group in 1831, but the search was ineffectual. This may arise from the variation of the positions given. The latter stated them to be in lat. $56^{\circ} 3'$, and lon. $157^{\circ} 50'$, which, should the first named be correct, would not certainly disprove their existence. The water here, however, looked discoloured, as though on a bank, but no soundings could be obtained. On January 14th, 1832, in lat. $56^{\circ} 26'$ S., and lon. $156^{\circ} 48'$ W., many birds were seen, and much sea-weed was floating about.†

EMERALD ISLAND (?)

This supposed island, in lat. $57^{\circ} 15'$ S., and lon. 163° E., was discovered by Capt. C. W. Nockells; to whom the nautical world is indebted for several useful observations in the Atlantic. The following extract from a communication to Mr. Purdy will explain all:—"At 11 a.m. on the 13th of December, 1821, in the ship *Emerald*, lat. $57^{\circ} 30'$ S., lon. by chronometer, $162^{\circ} 12'$ E., we saw the resemblance of an island bearing E. by N., about 25 miles distant. It appeared very high, with peaked mountains. At 4 p.m. the weather became hazy, and commenced blowing a strong gale from that quarter, which lasted for two days; in consequence, we had not an opportunity of ascertaining any particulars. No account of any land seen there has been heretofore given. Several penguins were seen swimming about the ship. Direction, N.E. and S.W., about 30 miles."

The supposed site of Emerald Isle (lat. $57^{\circ} 15'$ S., lon. $162^{\circ} 30'$ E.) was passed by Capt. Wilkes, January 9th, 1841, without seeing it or any other indications of land. It was therefore inferred not to exist in the locality laid down. The current was again found bearing to S.E. 20 miles a day.‡

MACQUARIE ISLAND.

This island was discovered in the early part of the present century by a colonial vessel, and received the name of the governor of New South Wales, a name

* Horsburgh, vol. ii. p. 700.

† Journal of the Royal Geographical Society, vol. iii. p. 700.

‡ Narrative of the United States' Exploring Expedition, vol. ii. p. 285.

which has been sufficiently distributed in many parts of this region. It is stated that the discoverers left a party on it, and the persons employed in shooting killed not fewer than 80,000 seals. It was visited, April, 1811, by Mr. T. Garbutt, in the brig *Concord*, and again in February, 1812, and at both periods found the winds and surf very strong. On both occasions his ship drove, and on the second his boat was upset in the surf, and it and all hands lost. Capt. Bellingshausen, of the Russian navy, visited it in 1820, and Lieut. Langdon, R.N., in 1822; both of these officers have given charts of the island, but they differ considerably from each other. According to the English chart, it is 38 miles in extent from North to South, and its North extreme, called *North Head*, is in lat. $54^{\circ} 19' S.$, and lon. $158^{\circ} 56'$, and its South end in lat. $54^{\circ} 56'$. According to the Russian surveyor, it is but 19 miles in extent, and its centre in lat. $54^{\circ} 39' S.$, and lon. $158^{\circ} 41' E.$ Agreeably to this the North point is 11' South of that given by Lieut. Langdon. But these observations may be considered as superseded by those of the United States' Exploring Expedition hereafter noticed.

Both the English and the Russian descriptions agree in giving it a breadth of 5 or 6 miles throughout. On the English chart soundings of from 10 to 90 fathoms are marked all along the eastern side at the distance of 3 miles off shore; also two anchorages, but which are open. The northernmost of these bears the name of *Buckle*, *Bagster*, and *Buchanan Bay*; the other, at 2 leagues from the South point of the island, is called *Lusitania Road*. The North point is surrounded by rocks, which are named *Elliot Rocks* on the chart.*

The South end of this island is placed by Capt. Wilkes, of the United States' Exploring Expedition, in lat. $54^{\circ} 44' S.$, and lon. $159^{\circ} 49' E.$ Off this end a reef of rocks extends for three-quarters of a mile. The island is high and much broken; it is apparently covered with verdure, although a long tufted rank grass was the only plant seen by those who landed.

The highest peak on the island is from 1,200 to 1,500 feet high; and, as far as the observations of the United States' Expedition extended, it had neither tree nor shrub on it. It affords no inducement for a visit, and apparently no suitable place for landing with a boat. A party landed with great difficulty, through the tremendous surf, in an indentation on the West side, and found it tenanted with countless myriads of sea-birds, penguins, and albatrosses.†

THE BISHOP AND HIS CLERK are some islands or rocks which lie to the southward of Macquarie Island, according to Capt. Bellingshausen in lat. $55^{\circ} 15' S.$, and lon. $159^{\circ} 0' E.$; but if Capt. Wilkes's longitude be correct, it must be placed more than a degree farther to the East.

THE JUDGE AND HIS CLERK, two large naked rocks, lie about 8 leagues N. $20^{\circ} E.$, true, from the North end of Macquarie Island; or, according to Bellingshausen, in lat. $54^{\circ} 22' S.$, and lon. $158^{\circ} 46' E.$; the latter subject, however, to the same question as raised in the previous instance.

* See Parry's Tables, p. 88; Krusenstern, part ii. p. 9; Hornsburgh, vol. ii. p. 662; Nicholas's New Zealand, vol. ii. p. 318.

† Narrative of the United States' Exploring Expedition, vol. ii. pp. 289-90.

CAMPBELL ISLAND

Was discovered by Capt. Fred. Hazelburgh, of the brig *Perseverance*, belonging to Mr. Robert Campbell, of Sydney, in 1810. According to his account, the island is 30 miles in circumference; the country is mountainous; and there are several good harbours, of which two on the East side are to be preferred. The southernmost of these two he named *Perseverance Harbour*, and in it Sir James Ross anchored in the *Erebus* and *Terror*, December, 1840.

The highest hill seen from the harbour is on its North side, and has an elevation of 1,500 feet. The shores on either side are steep, and rise abruptly to between 800 and 900 feet. The hills, from being less wooded, have a more desolate appearance than those of the Auckland Islands; and though there is abundance of wood in the sheltered places, the trees are nowhere so great as in those islands. These trees especially indicate, by their prostrate position, the prevailing power of the westerly storms. This occurrence of sudden and violent rushes of wind is a remarkable characteristic phenomenon of all the islands about this latitude. It is observed at Kerguelen Land, at Auckland, and especially here.

Sir James Ross had been advised at Van Diemen's Land to take his ships into the harbour near the N.E. point, but, from the entrance, it appeared so exposed to winds from that quarter that he bore away for the southern harbour.

Perseverance Harbour is about 4 miles in depth, running for more than 2 miles in a W.N.W. direction; and thence, after passing a shoal point, with a warning bed of sea-weed off it, on which the *Terror* grounded, about W.S.W. to its head. In the outer part of the harbour the water is too deep for convenient anchorage; but in the upper part, which is completely landlocked, there is abundant room for a hundred ships to lie in the most perfect security, and excellent water can be had in any quantity. The remains of some huts were found on each side of a cove to the North of the *Erebus* anchorage; as also the graves of several seamen, and one of a French woman, accidentally drowned. There had been also an establishment at the side of a stream in the N.W. corner of the harbour, but the position was not so good as that of the cove. The observation spot on the beach, near the shoal point, was found to be in lat. $52^{\circ} 33' 26''$ S., and lon. $169^{\circ} 8' 41''$ E.; variation, $17^{\circ} 54'$ E., dip, $73^{\circ} 53'$. High water, full and change, at XII^h, but presenting the same irregularities as at Laurie Harbour, Auckland Isles. The rise and fall, at neaps, was 43 miles.*

* Sir James C. Ross, *Voyage of Discovery, &c.*, vol. i. pp. 164, *et seq.* A detailed account of its productions will there be found.

AUCKLAND ISLANDS.

The first knowledge of this group is due to the commercial enterprise of British merchants. They were discovered by Capt. Abraham Bristow, in the ship *Ocean*, a vessel belonging to the late Samuel Enderby, Esq., during a whaling voyage, August 16th, 1806. This was in his third voyage round the world, and the following extract from his log-book, quoted by Sir James Ross, announces the discovery:—"Moderate and clear; at daylight saw land, bearing West by compass, extending round to the North as far as N.E. by N., distant from the nearest part about 9 leagues. This island or islands, as being the first discoverer, I shall call *Lord Auckland's* (my friend through my father), and is situated, according to my observation at noon, in lat. $50^{\circ} 48'$ S., and lon. $166^{\circ} 42'$ S., by a distance I had of the sun and moon at half-past ten, A.M. The land is of a moderate height, and from its appearance I have no doubt but it will afford a good harbour in the North end, and I should suppose lies in about the latitude of $50^{\circ} 21'$ S., and its greatest extent is in a N.W. and S.E. direction. This place, I should suppose, abounds with seals, and sorry I am that the time and the lumbered state of my ship do not allow me to examine it."

Capt. Bristow visited them in the following year, 1807, in the *Sarah*, also belonging to the Messrs. Enderby, when he took formal possession of them for the British crown, and left some pigs there, which have since increased to a surprising extent.

The islands remained untenanted during the subsequent years, being visited occasionally by vessels in search of whales and seals, the former coming into the bays to calve, during the months of April and May, and the latter consisting chiefly of sea-lions. Among those who came hither (in 1829) was Capt. Morrell, whose work we have before quoted, and whose description of the port he states he examined, is given presently.

In the year 1840 it was visited by the vessels of three nations—the English ships, *Erebus* and *Terror*, under Sir James Ross and Capt. Crozier; the French corvettes, *L'Astrolabe* and *La Zélée*, under Dumont D'Urville; and the United States' Exploring Expedition, under Capt. Charles Wilkes. From the narratives of these voyages we have chiefly derived the subsequent particulars.

They were, as above mentioned, without permanent inhabitants during all the periods of the above visits; but subsequently, a body of New Zealanders, about seventy in number, came over from Chatham Island in a whale-ship, and were landed on the N.E. or Enderby Island. Bringing with them their warlike spirit, their quarrels soon led to an outbreak, and some fighting and loss of life ensued. They then divided into two separate bodies, under different chiefs, about thirty remaining in their original locality; twenty-five more going to the southward; the remainder maintaining separate independence.

From the eminent services rendered to geographical science, and to further those commercial enterprises in which the Messrs. Enderby, for several generations, had so largely engaged, the group was granted by the British government to Messrs. Charles, George, and H. Enderby; and on the formation of the Southern

Whale Fishery Company, who have undertaken the establishment of their principal centre of operations here, Mr. Charles Enderby, with an efficient staff of assistants, took possession of his domain in the early part of 1850, finding the New Zealanders before mentioned in possession of a portion of the land. Their claims were soon adjusted, and they have become great auxiliaries to the infant colony.

This, then, is the brief history of this remote island, which promises to become a most conspicuous point in the wide world of waters which this book describes. With every advantage of insulation, the possession of numerous and excellent harbours, with every means at command for the relaxation of whale and other fisheries in these seas, it must some day become the centre of much trade, and that, too, of a very different character to almost every other part of the South Pacific.

Though the group has been visited by the four principal navigators above mentioned, Morrell, describing a southern harbour, which he calls Carnley's Harbour, and the three others all having confined their remarks to the northern or Laurie Harbour, we have but an imperfect notion of the entire group, even as regards its dimensions. For from the cursory examinations made by Mr. Enderby up to the last accounts, it would appear that the island must be considerably broader than is represented on D'Urville's chart. Of course, the very imperfect sketch given by Bristow cannot be taken as giving a correct idea of the island.

The following imperfect notices of the group are collected from the Narrative of the Voyage and Discovery, &c., of H.M.S. *Erebus* and *Terror*, vol. i.; the Narrative of the United States' Exploring Expedition, vol. ii.; *Le Voyage de L'Astrolabe et La Zélée*, par M. Dumont D'Urville; and the Narrative of Four Voyages, by B. Morrell. These sources have been also combined in a brochure by C. Enderby, Esq., F.R.S., "A Short Account of the Auckland Islands, &c., London, 1849;" and see also the Quarterly Review for June, 1847.

Mr. M'Cormick, the naturalist to Sir James Ross's Antarctic Expedition, remarks that the formation of the Auckland Islands, as well as Campbell Islands, is volcanic, and constituted chiefly of basalt and greenstone. He also calls attention to *Peas Head*, in Laurie Harbour, North of Shoe Island, as being of great geological interest, exhibiting fine columns, 300 feet high, which are highly magnetic. The loftiest hill, *Mount Eden*, at the head of Laurie Harbour, attains an elevation of 1,325 feet, is rounded at the top, and clothed with grass to its summit. Another hill in the West rises to nearly 1,000 feet.

PRODUCTIONS.—Dr. Hooker, whose observations have been published in connexion with the Voyage of the *Erebus* and *Terror*, under the title of *Flora Antarctica*, remarks that, "perhaps no place in the course of our projected voyage in the southern ocean promised more novelty to the botanist than Auckland Islands. Situated in the midst of a boisterous ocean in a very high latitude for that hemisphere, and far removed from any tract of land but the islands of New Zealand, they proved, as was expected, to contain amongst many new species some of peculiar interest.

"Possessing no mountains rising to the limits of perpetual snow, and few rocks or precipices, the whole land seemed covered with vegetation. A low forest skirts

all the shores, succeeded by a broad belt of brushwood, above which, to the summit of the hills, extend grassy slopes. On a closer inspection of the forest, it is found to be composed of a dense thicket of stag-headed trees, so gnarled and stunted by the violence of the gales, as to afford an excellent shelter for a luxuriant under-growth of bright green feathery ferns, and several gay-flowered herbs.

“With much to delight the eye, and an extraordinary amount of new species to occupy the mind, there is here a want of any of those trees or shrubs to which the voyager has been accustomed in the North; and one cannot help feeling how much greater the pleasure would be to find new kinds of the pine, the birch, willow, or the oak, than those remarkable trees which have no allies in the northern hemisphere, and the mention of which, suggesting no familiar form to compare them with at home, can interest few but the professed botanist.

“Eighty flowering plants were found, a small number, but consisting of species more remarkable for their beauty and novelty than the flora of any other country can show, no less than fifty-six being hitherto undescribed, and one-half of the whole peculiar to this group, as far as is at present known.”

The *trees* on the island have been stated by some as rising to 70 feet in height, by others only to 30 feet. Both may be right, for they are most generally found to have been overturned by the strong gales, which is readily done from the nature of the soil they grow in, a very deep light peaty earth, which affords but little support for the roots. The trunks attain a diameter of 4 and 5 feet at times, but, from the above-mentioned cause, the stems are seldom straight enough to afford timber of any magnitude; for knees, or such purposes, it may be very valuable. Abundance of fuel from this source, then, may be relied on. The peat, too, which covers the greater portion of the land, might be made available for this purpose, but not perfectly so by the usual mode adopted in Ireland.*

Water, as an article of consumption, is very abundant. The stream which falls into the head of Laurie Harbour had sufficient water to form a noble cataract after a month's dry weather, and indeed abundance of streams are to be met with at all parts. The nature of the soil is such that, whatever quantity of rain falls, it very quickly sinks below the surface, and then probably percolates away on the volcanic and impervious rocks beneath. From the moisture of the climate, and the igneous character of the rocks, this peaty formation arises. This vegetable formation is found to be several feet in thickness, and consists of a mass of decomposed black vegetable fibre, which, if properly compressed, makes good fuel. Great difficulty was found in forming a foundation for the observatory at the time of the *Erebus* and *Terror's* visit; they had to dig 12 feet through the peat to gain the solid rock on which to erect the instruments.

* As an evidence that the wood will burn, a quality not always found in these latitudes, Sir James Ross says:—“Some of our officers, finding it very laborious walking through the dense brushwood in their way to the western hills, opened a road by setting fire to the dried grass and sticks, which, being fanned by a strong breeze, spread with great rapidity in all directions, burning a great part of the wood near which our observatory was fixed; but fortunately did not approach to within half a mile of it. The whole country appeared in a blaze of fire at night. The scene, as viewed from our ships, was described as one of great magnificence and beauty. It was, nevertheless, a thoughtless prank, and might have been productive of great mischief, besides destroying so much valuable wood.”

The magnetical observations made here were found to be singularly affected by the nature of the island. Some of the magnets were found entirely to depend for their direction of the North and South poles on the fragments of rocks around them. The compasses in the *Terror* were so much affected by Shoe Island as to mask the local attraction of the iron in the ship. These phenomena lead to the opinion that the island may be taken as one great magnet itself.

Respecting the zoology of these islands, Mr. M'Cormick observes—"There is no species of land-animal, with the exception of the domestic pig, introduced several years ago in the island by Capt. Bristow." Their food consists of the "*Arabia polaris*," described by Dr. Hooker as "one of the most beautiful and singular of the vegetable productions of the island it inhabits; growing in large orbicular masses in rocks and banks near the sea, or amongst the dense and gloomy vegetation of the woods, its copious bright green foliage and large umbels of waxy flowers have a most striking appearance."*

"The whole plant," he adds, "has a heavy and rather disagreeable smell common to many of its natural order; but it is nevertheless greedily eaten by goats, pigs, and rabbits. It is so abundant in marshy spots that these animals frequently live entirely amongst it, particularly where it grows near the margins of the woods, where they form broad tracks through the patches, grubbing up the roots to a great extent, and, by trampling down the soft stems and leaves, make soft and warm places for themselves to litter in."

One of these animals was shot by Mr. Hallett, and, although in poor condition, its flesh was considered well flavoured, though by no means equal to that of our own well-fed pigs.

Laurie Harbour and the North part of the island are thus described in a Narrative of the United States' Exploring Expedition in the ship *Porpoise*, dated 7th March, 1840 :—

"On the 7th we anchored in the harbour of Sarah's Bosom, in 12 fathoms water. During our brief stay here all were actively employed wooding and watering, for which this harbour affords a fine opportunity. Assistant-Surgeon Holmes made several excursions on the largest island, of which he gives the following account :—

"I found it very thickly covered with trees in its less elevated parts. As few of them were of any size, I found no small difficulty in penetrating and making my way through them; in many places it was absolutely impossible. It was only after a long and fatiguing walk that I succeeded in reaching the summit of that part of the island near which the brig was anchored, when I found the trees less numerous.

"A thick growth of underwood and dwarf bushes, intermixed with ferns, concealed the surface, rendering it difficult to walk. Even in the places apparently most level the ground was very unequal, and a single step would sometimes send me nearly up to the neck into a hollow filled with large fern-fronds.

"On the highest parts the small level spots were covered only with moss and a description of tall grass, and in places also a kind of grain grew abundantly;

* *Flora Antarctica*, p. 20.

the ground was dry everywhere, all the water being found in the streams, which were numerous and pure.

“Near the summit the ground was perforated in all directions, probably by birds who rear their young in these holes. Many of the birds, principally *procellaria*, were sitting on the ground; they made no effort to escape, but suffered themselves to be taken without any attempt at resistance.

“The forest was full of small birds of three or four different species, which were perfectly fearless; one little fellow alighted on my cap as I was sitting under a tree, and sang long and melodiously; another, and still smaller species, of a black colour, spotted with yellow, was numerous, and sang very sweetly; its notes were varied, but approximated more nearly to the song of our blackbird; occasionally a note or two resembled the lark's. Hawks, too, are numerous, and might be seen in almost all the dead trees in pairs.

“Along the sea-coast were to be seen the marks of their ravages upon the smaller birds. The sea-birds were very numerous on the opposite side of the island, sitting upon the cliffs or hovering over the islet. On the western side of Auckland Island the underbush and young trees were exceedingly thick.’

“Dr. Holmes remarks, that he was occupied fully an hour in making his way for 100 yards, where, to all appearance, a human step had never before trodden. There was not a vestige of a track; old trees were strewn about irregularly, sometimes kept erect by the pressure from all sides. Some trees were seen upwards of 70 feet in height, although they were generally from 15 to 20. Every part of the island was densely covered with vegetation. The soil, from the decomposition of vegetable matter, had acquired considerable richness. Specimens of all the plants were collected; some resembling the tropical plants were found here.

“These islands have in many places the appearance of having been raised directly from the sea; they are the resort of whalers for the purpose of refitting, and waiting the whaling season, which occurs here in the months of April and May. Near the watering place a commodious hut has been erected by a French whaler. Near by there was another in ruins, and close to it the grave of a French sailor, whose name was inscribed on a wooden cross erected over it. Some attempts at forming a garden were observed at one of the points of Sarah's Bosom, and turnips, cabbages, and potatoes were growing finely, which, if left undisturbed, will soon cover this portion of the island; to these a few onions were added.

“Many of the small islands in this group were visited; they closely resemble the larger one. The cliffs consist of basalt, and are generally from 50 to 90 feet perpendicular.

“These islands have a picturesque, wild, steep, and basaltic appearance; the highest peak was estimated to be 800 feet; the smaller has a less elevation. The general aspect of the land resembles the region round Cape Horn.”

CLIMATE.—As is mentioned elsewhere, no very accurate knowledge of the general climate of the group is as yet acquired. It has been supposed to be similar to *Chiloë*, which has been described in a former page of this work. To

this, therefore, the reader is referred. But it is also very probable that that account, to coincide with these islands, must be somewhat modified in one particular—the strong winds to which it would appear they are subject to. The trees are an evidence of this, as they bend from the general westerly direction of the violent squalls. Mr. Enderby has experienced one very remarkable phenomenon, in the early part of 1850, at the station in Port Ross. A most violent gust of wind struck, with the force of a solid body, the spot near where he was, and this not for any continuous period, or over an extended space, but only for about five seconds of time and a few yards in diameter. After passing onward the percussions of the repeated shocks could be heard at short intervals as it went. There was no apparent cause for it, and the intervening spaces were comparatively calm. This would form an important consideration with vessels unprepared for such a visitation when at anchor.

The Auckland group, according to Sir James Ross, consists of one large and several smaller islands, separated by narrow channels. The largest island he states to be about 30 miles long, and 15 miles in extreme breadth; but this cannot be considered as exact, as before mentioned. It contains, he continues, two principal harbours, whose entrances are both from the eastward, and whose heads or termination-reach within 2 or 3 miles of the western coast.

ENDERBY ISLAND is the north-eastern island of the group; it forms the northern side of the entrance to Laurie Harbour, or Port Ross. It is upon this island that the principal portion of the stock landed by the Whale Fishery Company is kept. They immediately began to improve in their new position, an evidence of the good quality of the land. The island, 2 or 3 miles in length, is capable of sustaining a large quantity of cattle, and at some future day will probably become of considerable importance in this respect. It is covered with peaty mould, which is capable of being rendered very productive. One portion of the New Zealand tribes was established here, and raise vegetables, turnips, potatoes, cabbages, &c., the first of excellent quality, excelling most others; the latter equal to any European productions. This augurs well that other fruits and plants may flourish. The island is not high, and is well supplied with water.

A *pilot station* has been established on it; vessels, therefore, visiting the group, can thence be conducted safely to the principal harbour to the S.W.

There is a narrow entrance to Laurie Harbour between the West end of Enderby Island and Rose's Island, which is only a channel fit for boats. The sea was breaking right across the opening when the *Erebus* passed it; but in calm weather it might be mistaken by strangers for a safe passage.

As is frequently the case, the tidal currents meet off Enderby Island; and on this Sir James Ross says:—"On rounding the N.E. cape of Enderby Island we passed through some strong whirlpools, occasioned by the meeting of the tides off the point; and although we did not find soundings with our ordinary hand lines, it is by no means improbable that some shoals or rocky patches may have some influence in producing these strong and dangerous eddies."

Laurie Harbour, or Port Ross.—Capt. Bristow, the discoverer of these

islands, who also drew the first sketch of the group, named this, the principal harbour, Laurie Harbour, after the gentleman who first issued this knowledge to the world in 1810. On a chart of the Western Pacific, by Capt. Butler, and published by Mr. Laurie, this sketch will be found. A copy of this chart by the late Mr. Purdy, presented to Capt. Hurd, R.N., was published by the Admiralty in 1823, and these composed our entire knowledge of them until the visits of Capt. Sir James Ross and D'Urville. D'Urville has given a rough survey of them, and Capt. Sir James Ross has given a survey of the harbour in question under the name of *Rendezvous Harbour*; but, following the recognised principle, we have retained the name applied by its discoverer in 1806. Mr. Enderby has given a third appellation, that of *Port Ross*, which, as it may be in some use, we have also retained. The other names are chiefly as given by Capt. Bristow.

There are two surveys of this excellent harbour; the one by Sir James Ross, the other by Admiral D'Urville. That of the latter is the most complete, and exhibits more in detail the character of the locality.

The entrance to the harbour is between Enderby Island on the North side, on which is the above-named pilot station, and *Green Island*, or Ewing Island of Sir James Ross, their distance apart being rather above a mile. *Ocean Island* is three-quarters of a mile West of Green Island, and is connected by shoal water to the S.E. point of the harbour. *Rose's Island*, which forms a continuation of the North side of the entrance, lies to the N.W. of Ocean Island; and from between these the harbour runs $2\frac{1}{2}$ miles to the S.W., having a depth of 10 to 20 fathoms over it, and the shores bold-to.

Peas Head, to the S.W. of Rose's Island, is an interesting feature, formed of basaltic columns 300 feet high.

Shoe Island, in the middle of the harbour, and three-quarters of a mile South, true, of Peas Head, is a bold and picturesque island; it is highly magnetic, and is bold-to.

Terror Cove is to the West of this, and is separated from *Erebus Cove* to the South of it by a projecting point of land.* Sir James Ross's observatory was in Terror Cove. In the former charts this is called the *Harbour of Sarah's Bosom*, being thus named by Capt. Bristow, when he came here on his second visit in 1807. He anchored here in the *Sarah*, hence its appellation. In his brief account he states that "ships may lie safely land-locked all round. Here may be had plenty of fine water, wood in the greatest abundance, winged game, &c. The islands are annoyed by the most powerful gales in winter."

The result of the observations made by Sir James C. Ross at *Sarah Harbour*, or Terror Cove, gave for the observatory, lat. $50^{\circ} 32' 30''$ S., lon. $166^{\circ} 12' 34''$ E.; variation, $17^{\circ} 40'$ E.; dip, $73^{\circ} 12'$. High water, full and change, at 12^h; the highest spring tides scarcely exceeded 3 feet. A remarkable oscillation of the tide, when near the time of high water, was observed; after rising to nearly its highest, the tide would fall 2 or 3 inches, and then rise again between 3 and 4 inches, so as to exceed its former height rather more than an inch. This irregular

* "By the side of a small stream of water, and on the only cleared spot we could find, the ruins of a small hut were discovered, which I have since learnt formed for several years the wretched habitation of a deserter from an English whale ship and a New Zealand woman."—*Sir James Ross*.

movement generally occupied rather more than an hour, of which the fall continued about twenty minutes, and the rise fifty minutes of the interval.*

The ESTABLISHMENT of the Southern Whale Fishery Company is fixed at the South side of Erebus Cove. This Cove is bounded on the South side by a small peninsula projecting in an E.N.E. direction,† and connected by a narrow isthmus; on the shore to the westward of this a section of 100 acres is allotted, which affords all the necessary room for the accommodation of shipping visiting the port. This beach allows of easy landing; and the land, being level, is suitable for the intended purposes of wharfage, whaling stores, &c.

From this part the head of the harbour extends nearly 2 miles farther in a W.S.W. direction to its head, on to which a fine and copious stream of fresh water falls. In its upper part Mr. Enderby found a large and valuable bed of cockles, little inferior to oysters. The southern side of the harbour does not require any particular notice.

The following is Sir James Ross's account of the harbour:—

“Rendezvous Harbour, which is at the North extreme of the island, contains several secure anchorages. The outermost of these, though convenient for stopping at a short time only, is a small sandy bay on the South side of Enderby Island, and about $1\frac{1}{2}$ miles from its N.E. cape.

“It is well protected from all winds except those from the south-eastward, and the holding ground is a good tenacious clay. It is probable that there may be found good anchorage also to the West of Enderby Island. After passing Ocean and Rose's Islands, a ship may anchor in perfect safety in any part, but the most convenient will be found to be between those islands and Erebus Cove, where abundance of wood and water may be obtained, as also at Terror Cove. The upper end of the inlet called Laurie Harbour is the most suitable for ships wanting to heave down, or to undergo any extensive repairs. It is perfectly land-locked, and the steep beach on the southern shore affords the greatest facility for clearing and reloading the vessel.

“I was so struck with the many advantages this place possesses for a penal settlement over every other I had heard named, to which to remove convicts from the now free colonies of New South Wales, New Zealand, and Van Diemen's Land, that I addressed a letter on the subject to Sir John Franklin on my return to Hobart Town, recommending its adoption. This letter was forwarded to the Secretary of State for the Colonies; but I believe Chatham Island, as being seated in a milder climate, has been preferred, although I am not aware of any other advantage it possesses; whilst the want of good harbours will be found a great drawback, and the two tribes of New Zealanders from Port Nicholson, who took possession of it in 1835, after eating one-half of the aborigines they found there, and making slaves of the other half, will prove a difficult people to dispossess of the land they have gained by conquest.

“Laurie Harbour is well calculated for the location of an establishment for the prosecution of the whale fishery; many black and several sperm whales came into the harbour whilst we were there, and from such a situation the fishery might be pursued with very great advantage.

* *Voyage of Discovery*, vol. i. p. 153.

† *Pig Point of Bristow*.

"We arrived there in the spring of the year, November being equivalent to the latitude of Hobart Town; we found a very great difference in the temperature, amounting to about 10° of the thermometer, but still greater to our feelings, owing to the increased humidity of the atmosphere, the temperature of the dew point being nearly the same in both places.

"It cannot, however, be considered severe when we remember that in England, which is very nearly in the same latitude, the mean temperature for April, the corresponding month, is 46° .* Our stay was too short to justify any farther remarks on the climate of these islands, but a series of well-conducted observations continued for two or three years could not fail to prove highly interesting and important to the advancement of meteorological science."

Sir James Ross made the islands during a fog, and had some difficulty in rounding to the northward:—"As we opened the harbour, the squalls came down the western hills with much violence, threatening to blow us out to sea again; and it required the utmost vigilance and activity of the officers and crew in beating up, at times, to maintain the ground we had gained. There is, however, ample space, and no concealed dangers. The belts of sea-weed, *macrocystus* and *laminaria*, which line the shore and rocks, point out the shallow or dangerous parts. After five hours of hard contending with the fierce westerly squalls, we anchored at one P.M., November 20th, 1840, in a small cove on the western shore in 10 fathoms."

Capt. Wilkes says:—

"The harbour of Sarah's Bosom is not the most secure; that of Laurie's is protected from all winds, and has a large and fine streamlet of water at its head. The rocks are covered with limpets, and small fish of many varieties are caught in quantities among the kelp. The crew enjoyed themselves on chowders and fries. No geese were seen; and the only game observed were a few gray ducks, snipes, cormorants, and the common shag. The land birds are excellent eating, especially the hawks. On the whole it is a very desirable place in which to refit."

Some officers of the French expedition under Admiral D'Urville made a boat excursion to Laurie Harbour; they thus speak of that part of the East coast, lying between the two harbours:—

"These banks are very full of fish; the bottom is regular, varying from 15 to 20 fathoms; the coast is indented with numerous creeks, surrounded by basaltic rocks, where boats can easily approach."

"If ever," says M. Dubouzet, one of the French officers, in his journal, "the fine harbours of these islands should attract colonists thither, Laurie Harbour would be the most suitable point for the site of a town."

Another, M. Jacquinot, says, "The vast bay is encircled everywhere by elevated land, clothed with trees from the seaboard to the summit; the soil, of volcanic formation, is covered with a thick layer of vegetable debris, producing a vigorous growth of large ferns."

The EASTERN SIDE of the island is but little known as yet. From the chart by Admiral D'Urville it has several most excellent harbours, a fact confirmed during

* At the Auckland Islands the average temperature during Ross's stay was $45^{\circ} 27'$.

some of the visits made by Mr. Enderby. That one will be found superior to Laurie Harbour is not likely, but they may prove of great service. One of them was named *Chapel Bay*, from a rock, the form of which gave the appellation, near its entrance.

ADAM ISLAND appears on Bristow's chart, and to the northward of it must be Carnley's Harbour of Capt. Morrell.

"CARNLEY'S HARBOUR makes in about 4 miles to the eastward of the South Cape, and the entrance is formed by two bluff points, from which to the head of the lagoon the distance is 15 miles. The^d passage is above 2 miles wide, and entirely free from danger within 25 fathoms of each shore. It runs in first N.N.W., then N.N.E., forming at the head of the lagoon a beautiful basin, with sufficient room for half a dozen ships to moor; the least water from the entrance until we came near the anchorage was 25 fathoms mid-channel; we anchored in 4 fathoms clay ground.

"The western side of this island is a perpendicular bluff iron-bound coast, with deep water within 100 fathoms of the shore, while the eastern coast is principally lined with a pebbly or sandy beach,* behind which are extensive level plains, covered with beautiful grass and refreshing verdure, extending back about 5 miles, and then rising into elevated hills.

"All the hills, except a few of the highest, are thickly covered with lofty trees, flourishing with such extraordinary vigour, as to afford a magnificent prospect to the spectator.

"The large trees are principally of two sorts. One of them is of the size of our large firs, and grows nearly in the same manner; its foliage is an excellent substitute for spruce, in making that pleasant and wholesome beverage, spruce-beer. The other resembles our maple, and often grows to a great size, but is only fit for ship-building or fuel, being too heavy for masts or spars of any dimensions.

"The quality of the soil in this island is sufficiently indicated by the uniform luxuriance of all its productions. Were the forests cleared away, very few spots would be found that could not be converted to excellent pasturage or tillage land.

"The valleys, plains, bill sides, and every spot where the rays of the sun can penetrate, are now clothed with a strong, heavy, luxuriant grass, interspersed with many natural specimens of the countless treasures of nature's vegetable kingdom. This extraordinary strength of vegetation is no doubt greatly assisted by the agreeable temperature of the climate, which is very fine.

"The climate is mild, temperate, and salubrious. I have been told, by men of the first respectability and talent, who have visited the island in the month of July, the dead of winter in this island, corresponding to our January, that the weather was mild as respects cold, as the mercury was never lower than 38° in the valleys, and the trees at the same time retained their verdure as if it was Midsummer. I have no doubt but that the foliage of many of the trees remains until pushed off in the following spring by the new crop of buds and leaves.

"At the time we were there the mercury seldom rose higher than 78°, although

* This description entirely agrees with the accounts of D'Urville and his officers.

it answered to our July. The weather is generally good at all seasons of the year, notwithstanding there are occasional high winds, attended with heavy rains.”*

The WESTERN SIDE of the island, according to Capt. Bristow, is very high and precipitous, and may be seen, in clear weather, 16 or 17 leagues off. Towards the northern part are two remarkable natural pyramids or columns, called the *Column Rocks*.†

The N.W. cape is a very remarkable headland, with a rocky islet and a curious conical rock just off it; just to the eastward of it is a dark-looking promontory, called *Black Head*, with a deep cavernous indentation at its base: this was afterwards found to be only a short distance from the westernmost part of Laurie Harbour. It was reached by Mr. McCormick, and some other officers, by following the stream, which empties itself into the head of the harbour, and whose source is in the hills above Black Head; these hills are from 800 to 900 feet high.‡

DISAPPOINTMENT ISLAND lies off the western side of the island, and is shown on Bristow's chart.

BRISTOW ROCK, which must be very dangerous, is also given from the same author as lying 8 miles North of Enderby Island, and is just even with the water's edge. It was not seen by Sir James Ross, and therefore requires great caution. This will close our remarks on this important group. The charts will furnish all additional information.

ANTIPODES ISLAND.

This small and isolated spot is but an imperfect representative in the South of London in the North hemisphere; from its geographical position its name was given to it, in 1800, by Capt. Waterhouse(?); but as it does not occupy the precise spot that this name would indicate, it has sometimes been called *Penantipodes* Island. It is a small, high, rocky, and rugged island, visible at a considerable distance. Its position is given as latitude $48^{\circ} 32' S.$, and its longitude, according to Lieutenant O. H. Wilson, R.N., is $178^{\circ} 42' E.$; but, according to Krusenstern, it is in $179^{\circ} 40' E.$ § Lieutenant Raper placed it in $179^{\circ} 42' W.$, which is probably nearer the truth.

BOUNTY ISLANDS.

This little group derives its name from a well-known vessel of the Pacific, that commanded by Capt. William Bligh, in 1788. They were seen on his passage to Tahiti, and he thus records their discovery:—"On the 19th September, 1788, we discovered a cluster of small rocky islands, bearing E. by N. 4 leagues distant from us. We had seen no birds or anything to indicate the nearness of land, except patches of rock-weed, for which the vicinity of New Zealand sufficiently accounted. The wind being at N.E. prevented our near approach to these isles; so that we were not less than 3 leagues in passing to the southward of

* Narrative of Four Voyages, by Capt. Benjamin Morrell, December 28, 1829.

† Purdy's Tables, p. 89.

‡ Sir James Ross.

§ See Nautical Magazine, March, 1840, p. 145. Lieut. Wilson, who has given a view of the island, says that in running on a parallel between lat. $49^{\circ} 50' S.$, and $53^{\circ} 0' S.$, from the longitude of $172^{\circ} 0' E.$ to $162^{\circ} 0' W.$, they observed tangles or trumpet weed daily floating past.

them. The weather was too thick to see distinctly; their extent was only $3\frac{1}{2}$ miles from E. to W., and about half a league from N. to S.; their number, including the smaller ones, was thirteen. I could not observe any verdure on them: there were white spots like patches of snow, but they may be of white stone or marble. The westernmost of these islands is the largest; they are of sufficient height to be seen at the distance of 7 leagues from a ship's deck. When the easternmost bore North, I tried for soundings, being then 10 miles distant from the nearest of them, and found bottom at 75 fathoms, a fine white sand; and again at noon, having run 6 leagues more to the E.S.E., we had soundings in 104 fathoms, a fine brimstone-coloured sand."*

Capt. Biscoe visited them in the *Tula*, in 1832, for the purpose of catching seals, but with very indifferent success. His observations remove them from lon. $179^{\circ} 6' E.$,† in which they had been given, to $178^{\circ} 26' E.$

The latitude, also, by some more complete observations by Capt. Martyn, of the ship *Lalla Rookh*, in 1846, is $47^{\circ} 55' S.$

CHATHAM ISLANDS.

This group was discovered by Capt. Broughton, attached to Vancouver's expedition, in the armed tender *Chatham*, from whence the usual name is derived. The following extract from Vancouver's Voyage will describe this event:—

November 26, 1791.—“In the evening the wind shifted suddenly to the S.W., and blew with such violence, that striking our topmasts and yards became necessary. A remarkably heavy following sea kept the vessel constantly under water; but the gale was attended with clear weather. At noon, on the 27th, our latitude, by observation, was $45^{\circ} 54'$, longitude, by account, $176^{\circ} 13'$. The gale now moderated, which permitted us again to resume our N.E. course, with a fine breeze between West and N.W. Early in the morning of the 29th low land was discovered, bearing, by compass, N.E. to E.N.E.; and, being then in 40 fathoms water, we brought-to until daybreak. About four o'clock we had 38 fathoms, sandy and broken shelly bottom, when the N.W. point of this land, which is low, bore by compass S. $7^{\circ} E.$, about 3 leagues distant, and which, after the man who fortunately saw it, from the fore-yard, I named Point Allison; a remarkably rugged rocky mountain, that obtained the name of Mount Patterson, S. $60^{\circ} E.$; a sugar-loaf hill, S. $84^{\circ} E.$; and the extreme point to the eastward, which formed an abrupt cape, N. $75^{\circ} E.$ Two islands N. $3^{\circ} E.$ to N. $5^{\circ} E.$, 2 or 3 leagues distant. The interior land was of a moderate height, rising gradually, and forming several peaked hills, which, at a distance, have the appearance of islands. From Point Allison to Mount Patterson the shore is low and covered with wood; from thence to the above cape was a continued white beach, on which some sandy cliffs and black rocks were interspersed, apparently detached from the shore. To the eastward of these rocks, between them and a flat projecting point, the land seemed to form a bay open to the westward. From this point to the above cape, a distance of about 2 miles, the cliffs are covered with wood and coarse grass.

* A Voyage to the South Sea in H.M.S. *Bounty*, by Lieutenant W. Bligh, pp. 55-6.

† Journal of the Royal Geographical Society, vol. iii. p. 109.

These cliffs are of moderate height, composed of a reddish clay mixed with black rocks. Several large black rocks lie off Point Allison and the cape, extending to a little distance; and, as we passed within about half a mile of the shore, the depth of water was 14 fathoms, broken shells and sandy bottom. This cape forms a conspicuous headland, and is the northernmost part of the island; I called it *Cape Young*. The above two islands lie very near each other; to the eastward of them lies a small rock, apparently connected, though at no great distance, by a reef; another rock, somewhat larger, is situated between them. They are of no great height, flat top with perpendicular sides, composed entirely of rocks, and much frequented by birds of different kinds. These, which from their resemblance to each other I called the *Two Sisters*, bear, by compass, from Cape Young N. 50° W. 4 leagues distant. We steered from Cape Young E. by N., keeping between 2 and 3 miles from the coast, with regular soundings from 25 to 22 fathoms. The shore is a continued white sandy beach, on which the surf ran very high. Some high land, rising gradually from the beach, and covered with wood, extends about 4 miles to the eastward of the cape. After passing this land, we opened the several hills over the low land we had seen in the morning, and could discern that many of them were covered like our heaths in England, but destitute of trees. The woods, in some spots, had the appearance of being cleared; and, in several places between the hills, smoke was observed. The beach is interrupted, at unequal distances, by projecting rocky points covered with wood. Over the banks of sand were seen a range of retired hills, at a considerable distance, in the direction of the coast. After sailing about 10 leagues, we came abreast of a small sandy bay. Water was seen over the beach, and the country had the appearance of being very pleasant. With our glasses we perceived some people hauling up a canoe, and several others behind the rocks in the bay. Fearful that so good an opportunity might not occur for acquiring some knowledge of the inhabitants, I worked up into the bay, which we had passed before the natives were discovered. We came to an anchor about a mile from the shore, in 20 fathoms water, sandy and rocky bottom. The eastern point by compass bore N. 78° E.; Cape Young, W. 12° S.; the larboard point of the bay, S.E.; the eastern point, from our anchorage, proved to be the termination of the island, to which I gave the name of *Point Munnings*."

Capt. Broughton afterwards landed, and took formal possession of the island, in the name of His Britannic Majesty. His description of the interior, too copious for this work, may be found in the voyage of Vancouver and the *Gazetteer* of Cruttwell. The people were like those of New Zealand. Although unprovoked, they began to assault the captain and his company upon returning to the boat; and a skirmish ensued, in which one of the natives was killed.

From the period of their discovery they had not been settled, or visited, except by the whalers, who came hither to refit, or follow the shore fishery, until 1840, when the purchases of land in New Zealand by the British company having suddenly ceased, in consequence of a proclamation, a vessel, the *Cuba*, was despatched hither by that company with Mr. Hanson as agent, and Dr. Dieffenbach as naturalist, to purchase the territory of the native chiefs. This, it was stated, was done; and it was resold to a Hamburg merchant for a large advance

on the coast. But as the colonization of this island was not included in the company's charter, the whole proceedings fell to the ground.*

The ensuing account of the Chatham Islands is that given by Dr. Dieffenbach, and the reader will find in the original paper an interesting account of the natives, which must here be limited to a few words :—

“The natives of these islands were found by Capt. Broughton to be a cheerful race, full of mirth and laughter, dressed in seal-skins or mats, and courageous enough to resist his landing. The sealers who first visited the island—and I met with some who had been there ten years ago—found the natives numerous and healthy, in number at least 1,200, and they were received by them with a hearty welcome. What a wretched change has taken place in the short interval which has since elapsed !—a change occasioned by the importation of about 800 New Zealanders, brought thither by an European ship in 1830 or 1831. Not 90 of the original natives now survive in the whole group ; a few years of slavery and degradation have reduced their numbers, and in a short time every trace of them will be lost, as even the New Zealanders have disdained to intermarry with them !

“These original inhabitants call themselves *Tuīti* ; but this name is now scarcely ever heard, as they themselves have adopted the name of *Blafello* (black fellow), which was kindly bestowed upon them by Europeans, and readily adopted by the New Zealanders. In comparison with the latter, they have indeed a darker shade of the skin, which is, however, by no means universal, as individuals may be found who are of as light a complexion as the former ; and the deeper hue of the Chatham Islanders may be in great measure attributed to their greater exposure and still greater uncleanness. They are neither so tall, muscular, nor well proportioned as their western neighbours, especially the women and the younger men.”

We have no very recent estimate of the number of survivors of these ill-fated people ; but their conquerors, with the jealousy and rivalry peculiar to the New Zealanders, were in almost continual warfare with each other, and a portion of them emigrated to the Auckland Islands, and were found there by Mr. Enderby at the commencement of 1850.

The ensuing is extracted from Dr. Dieffenbach's account :—†

The whole group consists of three islands : a large one, called *Ware-kauri* by the natives, and *Chatham Island* by its first discoverer ; a smaller one, named *Rangi-haute*, or *Pitt's Island* ; and a third, called *Rangatira*, or *South-east Island*. In some charts, or rather sketches, an island is laid down, called *Cornwallis Island*, but I have been repeatedly assured that no such island exists ; and that a rock, called, from its shape, ‘The Pyramid,’ must have been mistaken for it. There are also, to the N.W., *Rangitutahi*, or the Two Sisters ; to the East, the Forty-fourth Degree Isles ; and some reefs, which will be described hereafter.

WARE-KAURI has nearly the form of a horse-shoe, or rather that of an indented square, the four sides of which are directed towards the four points of the compass. On its West side, where ships coming from New Zealand will

* See *Augsburg Gazette*, December 15, 1841 ; and *Times*, December 29, 1843.

† *Journal of the Royal Geographical Society*, vol. xi., 1841, p. 195, *et seq.*

generally first make the land, it stretches in a semicircle from S.W. to N.W., so as to form a deep bight (*Waitangi* or *Petre Bay*). The land has there an undulating surface of small elevation, and is overreached to the North and N.W. by higher insulated hills, which have either regular pyramidal forms, or are irregular and massive in shape. With the exception of two hillocks at the S.W. point of the island, which the natives name *Wakkaiwa*, no hills are visible in that direction; but the land rises gradually from the shore, which is rocky, and clothed with verdure to the water's edge, and at the top of the slope spreads out into a level or undulating surface. On advancing towards the inner part of the bight, a red cliff, or rather bluff, becomes visible, which forms the southern headland of a smaller inlet into the larger bight, the northern head of which is a bluff of the same description. The distance between these two bluffs is by measurement 3 miles; the beach between them is sandy, and bordered by low hills. This inlet has a very regular, semicircular form; and under the southern bluff is the principal harbour, called *Waitangi*. From the northern bluff the beach becomes again sandy for some miles, and afterwards rocky, which it continues to be to the N.W. point of the island, being indented by four small bays, three of which are close together, the fourth being near to the N.W. point. These bays open to the S.E. by E.; and two of them, though small, are good harbours.

The direct distance, in a straight line from the S.W. to the N.W. point of the island, is 25 miles; measured along the beach the distance is about 40 miles; whence it appears that the bight forms a deep curve.

The northern side of the island runs nearly from West to East, and forms several wide, open bays: to the westward the shore is flat, and the headlands of the bays run out in long, wooded tongues of land. About 10 miles from the N.W. point there is a group of irregular hills, which terminates in a rocky precipice towards the sea, from the foot of which runs out a spit with a level beach. These hills are called *Maunga-nui* (the high mountain), although they are of very inconsiderable elevation. This spit forms one termination of an open bay, stretching about 10 miles along the coast. Its eastern boundary is a headland, terminating in a hilly promontory, the sides of which are steep or perpendicular. The shore between them consists generally of sand-hills, which are wooded to a short distance inland, and are either shelving or cut down into cliffs by the action of the waves, so as to show their geological structure. In the middle of this bight, four needle-shaped rocks lie off the shore, from which they are distant about a cable's length. The beach itself consists of a fine sand. On the other side of the headland the shore retreats again, and runs for about 15 miles to the eastward, with a broad beach and low wooded hills. Although the beach is sandy, rocks spread along the shore are left uncovered by the sea at low water: this beach is terminated by a long point, behind which, very near to the N.E. end of the island, there is a small bay, *Kainga-roa*, with an entrance partly obstructed by rocks. Its N.E. end is extremely rocky; and its outermost point is formed by an island, or rather a peninsula, called *Wakuru*, as the channel which separates it from the main island is dry at low water.

The length of this northern shore is about 48 miles; but of course more when reckoned along the beach, on account of its many curves and indentations.

The coast continues to be rocky on the East side of the island, when it again forms a bay nearly 2 miles long, enclosed by a broad sandy beach and low wooded hills. Rocks, most of them only visible at low water, are everywhere scattered along the shore; and, with easterly winds, a heavy surf and high breakers roll over them for several miles from the land. The southern head of this beach is perfectly rocky, and from thence a long, deep bay extends to the S.E. point of the island. Sand-hills are thrown up along the coast, and stunted shrubs cover them on the weather-side. The S.E. point is formed by a hilly promontory covered with wood. The distance from the N.E. to the S.E. point of the island is upwards of 24 miles in a straight line, and 35 miles along the shore.

The southern shore is abrupt and precipitous; the land on the summit of the cliffs is level, and covered with trees. Small streamlets trickle down the cliffs, and clothe their face with herbage.

Geologically speaking, the Island of Ware-kauri belongs to New Zealand; and this is still farther confirmed by its plants and animals. The whalers say that soundings can be obtained between New Zealand and Chatham Island, a remarkable phenomenon, upon which, however, I shall not enlarge here.

Having thus described the structure of the rocks, which may be considered as the skeleton of the island, I shall describe its uppermost coat, which by many will be deemed far more interesting.

The surface in the northern half of the island is generally undulating, deep, and boggy. In the hollows it is often marshy; but, from its height above the sea, it can everywhere be easily drained. This promises to be highly productive, and equally fit for grain or pasturage. Wherever the superfluous water has been carried off by a natural outlet, a rich vegetation of fern and New Zealand flax (*phormium tenax*) has sprung up, giving additional firmness to the soil by decayed leaves, and yielding a rich harvest to the native planter. This is particularly the case on the low hills above the sea-shore, which are well wooded, and encircle the island with a verdant zone. Where these hills are sandy, the decayed leaves cast by the trees have formed a light, black soil, which the natives prefer for agriculture. The conical hills, which rest on a volcanic rock, have a very rich soil in their neighbourhood, which is generally covered with a vegetation of fern and trees, agreeably mixed together, and these fertile spots are like so many oases rising from the surrounding bog. On the West side of Wanga-roa Bay, and at other places between Maunga-nui and Emo-kawa, the soil has been set on fire by some cause or other, and is burning slowly beneath the surface; the temperature, also, although neither flames nor fire are visible, is much raised. "Te abi kai kai te one one" (the fire consumes the earth), say the natives; and, in consequence of this slow combustion, which had begun before the New Zealand colonists settled here, six years ago, and may, indeed, be traced to a much earlier period, the soil in the neighbourhood is gradually sinking. The vegetation at these places is extremely vigorous, though the soil is perfectly dry. A phenomenon like this, of a burning soil, is not unparalleled, as in several places beds of coal, accidentally ignited, have continued to burn slowly for a long series of years: this is therefore explicable, without any reference to volcanic agency.

What has been already said applies almost exclusively to the northern part of the island, which presents another remarkable feature, viz., several lakes, usually surrounded by gently sloping hills. These lakes are, for the most part, at the back of the low hills which run parallel with the coast, for there is generally an outlet for the water into the sea. They are most frequent near the northern coast, and are usually 1 or 2 miles in circumference. There are some also not far from the beach near the western coast; the largest of which is at the head of Waitangi Bay, and about 6 miles in circumference. A river, named *Te Manga-pe*, from 6 to 8 yards broad, drains this lake, and is tributary to another river, which enters Waitangi Harbour. The hills surrounding these lakes are slightly wooded, and form a beautiful feature in the Ware-kauri landscape. The shores of the Manga-pe River are low, and, at some places, its water is stagnant.

This lake is separated by a range of low fertile hills from *Te Wanga*, the largest lake in the island, which is, however, brackish. It is about 25 miles long, and 6 or 7 broad, and therefore occupies a very large portion of the whole island. It is surrounded by hills either wooded or boggy. On its eastern side it is separated from the sea by low sand-hills, about 100 yards broad. At one place the intervening hills disappear, and between the lake and the sea there is only a low sandy beach: the level of the lake is about 2 feet above high-water mark. Its water is generally only slightly brackish, probably from infiltration, as it is supplied by two large streams, which would otherwise make its water fresh. They descend in a serpentine course from a range of low hills which run from North to South to the southern extremity of the island. Although only a few yards broad, these streams are deep and rapid, discharging their waters into a long branch of the lake. Both these rivers would be very useful for turning mills. The Wanga occasionally empties its waters into the sea, by breaking over its low barriers. This may happen periodically, when it has been sufficiently replenished by its tributaries, or perhaps after particularly wet seasons. In such cases a vast quantity of its waters is discharged. The land at its southern extremity is then left dry to the extent of several miles, and the way from Wai-keri, a native settlement on the eastern shore, to Waitangi Harbour on the western, is much shortened. In 1837 this barrier was broken through; in 1840 it was entire; in 1841 a channel again formed that appeared to be, but was not, accessible for boats. At first the lake diminished in size, but afterwards it increased, and partook of all the movements of the tide.—(Geographical Journal, vol. xii. p. 142.)

The larger and better part of the island is that to the southward of Waitangi Harbour. It has an undulating surface, is not so boggy as the rest, and is either covered with an open forest of moderate size trees, or with high fern, in which case the land can be brought into cultivation with very little labour. In general the soil is extremely fertile, and preferred by the natives to that of New Zealand, where the soil is often covered with almost impenetrable forests. The winds which sweep over these islands are not sufficiently violent to injure vegetation; and it is only in a few peculiarly exposed places on the coast that the shrubs appear stunted.

It is worthy of remark, that some of the streams and rivulets are black, and of a light brown tint even in transmitted light ; but this may be easily explained, as they ooze from boggy land. Notwithstanding this, however, the water is excellent, and fit for all purposes. The *Mangatu*, the principal stream which flows into Waitangi Bay, has a bar at its mouth, which is passable by a boat only at high water ; but beyond the bar, the river is navigable for about 3 miles, even at low water, as its depth is often 12 feet, though its channel is narrow. It then becomes a mere rivulet, which winds its way through a deep valley from East to West. It rises from a range of hills in the southern part of the island, near the two rivers which discharge themselves into the Wanga. The length of the Mangatu is about 12 miles ; at its mouth the left shore is higher than the right, which forms a low land : both are wooded or covered with fern. That strange plant, the karaka tree, with its glossy leaves, and fruit of a golden yellow, a very handsome dracophyllum, and many other trees and shrubs, enlivened by singing birds and the splendid parrot, together with the unshorn honours of the native forest, form a beautiful and impressive scene. The clear, tranquil, and transparent, though black, water of these streams reflects every object with a very distinct outline, like a darkened landscape-glass.

On a careful examination of the structure of this island, it is manifest that the sea has left many places bare which were once covered by its waters.

“ During my stay there, in the months of May, June, and July, I always found the climate extremely mild and agreeable. After eight o'clock in the morning, the thermometer was never below 45°, or above 60° of Fahrenheit's scale, though it was then the winter season. I was often obliged to sleep in the open air, covered only by a light cloak ; and though it was sometimes wet with dew in the morning, I never experienced any inconvenience. Being surrounded by the sea, the air is always moist and cool, but never misty, the vapour being carried off by the constant breezes. Even during the winter the sky is generally cloudless and of the deepest blue. The changes of temperature are neither so sudden nor so frequent as in New Zealand, where they are occasioned by the neighbourhood of high mountains, capped with snow. Chatham Island being far in the ocean, at a distance from any neighbouring land, its heat and cold are both moderated by the sea-breeze : but there is no want of rain ; and we had showers for a few hours every week. The prevailing winds are N.E. and S.W. The climate appears very favourable to European constitutions.

In the general description of the coasts I have mentioned several larger or smaller bays ; and, as they form the harbours of the island, I shall now attempt to give a more detailed description of them.

WAITANGI BAY is the first ; it is situate in 43° 58' S., and 176° 38' W. Though exposed to the N.W. winds, the force of the swell is broken by the N.W. end of the island, and also by a short reef, which runs off from the southern bluff, and may be doubled by ships of any size to half a cable's length. From the south-westerly winds which prevail during a great part of the year, this harbour is completely sheltered. Its general depth of water is from 7 to 12 fathoms, and the best anchorage is in 5 fathoms, off the southern bluff, where the bottom is a firm sand. If a ship anchors farther to the northward, she is more

exposed to the swell occasioned by long north-westerly gales; and the danger increases if she anchors too near the shore.

The tide in this place comes from the southward, but is very irregular, generally recurring only once in twenty-four hours; and, at changes, it rises to about 6 feet. If easterly and southerly winds have long prevailed, the tide cannot be perceived at all, and its force is hardly ever perceptible at any time.

The land in the neighbourhood of this harbour is the richest in the island, being a black loam. For some years past this harbour has been much visited by ships for laying in fuel, provisions, and water, which can easily be procured there. During my stay there were never less than five vessels lying in this harbour; and, in the whole whaling-season of 1840, thirty vessels came hither for refreshments.

For ship-timber, the wood of the island is not fit: it can only be used for inconsiderable repairs.

A cargo can be landed at all times at a place where there is no surf, and the water is constantly smooth.

The next harbour which the *Cuba* entered is Wanga-roa, to the northward of Waitangi. This bay is an oval, nearly a mile deep, its extreme points being half a mile distant from each other. The best anchorage is about two-thirds up the bay, somewhat nearer to the western than to the eastern shore, in 6 fathoms water, with a soft sandy bottom. The anchorage is protected from N.W. winds by the land, and from S.W. winds by the lee of the western side of the harbour. The tides are here also irregular. The harbour of Waitangi is, however, preferable, as the country is here bare of wood, and uninviting, being merely an undulating boggy moor. Provisions also must be brought by the natives from a distance, for there are few cultivated spots near the bay: but, as two Europeans have already settled here, this harbour will doubtless be hereafter of some importance, as the best of the four in this neighbourhood.

The two others to the eastward of Wanga-roa, called *Wanga-moe* and *Wanga-tehe*, are nearly similar to Wanga-roa, and perhaps offer the same advantages; but they have not yet been tried, and there is nothing particular to recommend them.

The bay to the westward of Wanga-roa, *Pohaute*, has nearly the same shape, but is more sheltered. The land around it is also richer and more cultivated. It was formerly the principal resort of vessels in quest of seals; and, as a large French whaler, the *Jean Bart*, was captured there by the natives, it evidently has a good anchorage.

The northern shore of the island is much exposed, and could only serve as a roadstead. It has, however, one sheltered bay, 6 miles from the north-eastern extremity, which, when surveyed, may prove a secure harbour; and if such, will be valuable, from its proximity to fine and fertile districts: its name is *Kainga-roa*. I have been told that it has an anchorage from 10 to 12 fathoms. The eastern and western extremities of this bay are rocky promontories, each terminated by a spit of reefs, over which breakers are continually seen. The outermost rock of the eastern point is below the surface, but is occasionally covered with breakers. The rocks above water, off the western point, extend to the middle of the entrance of the bay, and are also terminated by a sunken rock 500 yards

distant. A ship can enter with a northerly wind between the two sunken rocks, and would be sheltered from all winds by the western point, where there seems to be the best anchorage. On approaching Kainga-roa from the land, an oval, smooth basin of water, bordered by gently sloping and wooded hills, opens to the view. This water has, however, no connexion with the sea, as I first supposed, but is merely a lagoon of brackish water. A low sandy beach, about 48 yards broad, intervenes between it and the sea, while the latter is hidden from sight by the hills surrounding the lagoon. This lagoon is of little depth, and its reeds and rushes are tenanted by vast flocks of ducks.

The channel by which this port is entered has not yet been surveyed, nor is there any native settlement in its immediate neighbourhood, but there are two on the eastern coast only 3 miles distant.

The eastern shore has been visited by whalers and trading vessels. The best anchorages are about 6 miles from the N.E. extremity, where a boat can land at all times, and at *Oinga*, where the hilly foreland offers some protection. But easterly winds often set in suddenly, which happened while the *Cuba* was lying there, in consequence of which she was driven out, and left her anchor and her long-boat behind.

The irregularity of the coast-line makes it difficult to form a correct estimate of the whole number of square miles contained in the island. At its north-western extremity its breadth does not exceed 4 or 5 miles; from Waitangi Harbour to the beach on the eastern side its breadth is 12 miles; the S.E. and southern part of it is the broadest, being about 15 miles. A rough computation gives for the whole surface 477 square nautical miles, or 305,280 acres. Of this, however, 57,600 acres, at least, are water, being lakes, lagoons, &c.; the land, therefore, cannot amount to more than 247,680 acres. Of these, 100,000 acres may be considered as productive: the rest, for the most part, affording good pasturage.

None of these hills are more than 800 feet in height. The westernmost is called *Mata Ketaki*, or *Mount Patterson*. Two or three miles from it there is a small group of hills, separated from each other by ravines, called *Maunga-nui*. The extremity of this group, nearest the shore, forms a perpendicular cliff 100 feet high; but it is separated from the sea by a flat beach, $1\frac{1}{2}$ or 2 miles in breadth.

Three miles distant from *Maunga-nui*, near the head of *Wanga-roa* Bay, there is another hill of small elevation, called *Emo-kawa*; three miles from which, near the head of *Wanga-tehe* Bay, is *Maunga-wakai-pai*, the most regular pyramid, and apparently the highest of all. Only a few miles from it is *Wai-papa*, likewise pyramidal. The last in the series, and that from which the original name of the island is derived, is *Ware Kauri*. It is situate about 2 miles from the northern shore, and 15 miles from the N.W. end of the island. It consists of several steep declivities, and is wooded. I had no opportunity of ascending it; but it is not higher than the others, and is apparently of the same structure. These are the only hills on the island, excepting two hillocks at its S.W. end, called *Waka-kaiwa*, which are an excellent sea-mark. Capt. Cecille, of the French marine, calls the S.W. point *Cape Evêque* (Point Beaufort), from this hill resembling a bishop's mitre.

Notwithstanding the manifest traces of volcanic action, this island does not appear to be subject to earthquakes, and none are remembered by its present inhabitants.

At 5 miles S. 20° E. from Cape Evêque is a rock under water, called the *Sentry* (or *Solitaire* by Capt. Cecille), upon which the sea breaks.

RANGI-HAUTE or PITT ISLAND is 14 miles E. 20° S. from Cape Evêque, and does not exceed 7 miles in length, North and South, nor 3 miles across, from East to West. This isle is thickly wooded; it is inhabited by a party of the aborigines of Chatham Island, and appears to be accessible only on the eastern side, in a narrow channel formed by the *Fort* (or *Attente Islet* of Cecille), to which it is very near."

Of the surrounding islands our descriptions are not so perfect as could be desired. In the preceding pages we have entirely followed Dr. Dieffenbach. Capt. Cecille was here to punish the natives for their capture and destruction of the *Jean Bart* whaler, and he has given a slight description of it. The remainder, then, is derived from both these sources. Dr. Dieffenbach says it consists principally of a mountain of moderate height, with a flat summit, and four sides, which extends nearly to the coast. It has no harbour. There is a safe passage between it and Ware-kauri; and the same, as he understood, is the case between Rangi-haute and Ranga-tira, which latter is a mere rock.

Three rocks, of remarkable form, which run about S.W. and N.E., lie to the westward of the South point of Pitt Island.

A round rock, at about 4 miles S. 11° E. from the South point of Pitt Island, and E. 42° S. from Point Beaufort or Cape Evêque, has all the appearance of a *bell*.

At 4 miles N. 32° E. from the Bell Rock is a danger near the water's edge, upon which the sea breaks.

At 18 miles East from the Bell Rock are three rocks whose position is doubtful.

At 17 miles E. 29° N. from the Bell Rock is the *Star Quay Reef*, whose position is also doubtful; but Dr. Dieffenbach saw these rocks, and says that they were marked by high breakers.

At 12 miles N. 28° E. from the Bell Rock is *Round Islet*. It is about 3½ miles from the North point of Pitt Island. There are some dangers between Round Islet and the point; but there may be, nevertheless, a passage between them.

There are many small sunken rocks to the South of Pitt Island, and four above water. The rocks are not above 2½ miles from the island.

About 14 miles West of Chatham Island are the *Bertier Rocks*. These are, one large and four small rocks, lying in a straight line East and West.

The "*Western Reef*" is a range of rocks lying off the N.W. end of the island, once a favourite resort of seals. The *Cuba* passed between this reef and the main, and found a clear channel.

Rangi-tutahi, or "the *Sisters*," are two pyramidal rocks about 100 feet high, covered with scanty bushes, and frequented by countless numbers of sea-birds. There is a long line of breakers running westward from these islets, which forms the "*North-West Reef*."

All these rocks were formerly much visited by sealers.

CHAPTER XXI.

NEW ZEALAND.

THIS very important country, one of the greatest interest in the southern hemisphere, was not correctly known to Europe until very recent times. Its first and imperfect exploration is due to Tasman. On December 13th, 1642, at noon, he saw a great and high land at 15 miles to the S.S.E. On the 14th, at noon, he was within 2 miles of it, in 55 fathoms, gray sand. He could not see the summits of the mountains, as they were hidden by the clouds. He sailed along the coast for several days, and on the 19th anchored in a bay, probably somewhere on the South side of Cook's Strait. The natives put off, and approached the *Zeehaan*, his vessel, and on sending off his boat, it was instantly attacked, and four of the crew killed. He then left this bay without landing, and named it *Moordenaar's* (Murderer's) Bay. He continued on the coast until the 6th of January, 1643, proceeding to the northward, and attempted to procure water from a small island, but was prevented by the hostile appearance of the natives on it, and the violent surf. He named it *Drie Koningen Eyland* (Three Kings' Island), because it was the feast of the Epiphany. He then sailed for the Friendly Islands.

The great imperfection of geographical knowledge, mixed up as this was with the fabulous, led Tasman to the belief that he had discovered a portion of the *Terra Australis Incognita*; and with this idea he considered that it might be connected with Staten Land, to the East of Tierra del Fuego, then recently discovered by Schouten and Le Maire, and accordingly named this *Staten Land*, in honour of the States General of Holland. But, soon afterwards, this continuity being disproved, its present name of *New Zealand*, after the Dutch province, was applied.*

It was not until our immortal Cook returned from his first voyage in 1769, that we were made acquainted with the true character of the group. In this, and in his two subsequent voyages, he completely examined their shores, and passing through the channel now bearing his name, established their insular nature. Although Cook's surveys and remarks, in many instances, do not approach to the accuracy and amount of detail required by the present times, yet they will be found of most essential service to the mariner, and his works will be frequently alluded to.

The other earlier navigators, who have transmitted accounts of their visits to New Zealand, are Capt. Surville, of the French ship, *Le St. Jean Baptiste*, in December, 1769, that is, at the same time as Cook;† then the unfortunate Capt.

* For an account of Tasman's voyage, see Burney, part iii. p. 72, *et seq.*

† Voyage aux Indes Orientales, &c., par l'Abbé Rochon, 1807, p. 382.

Marion came here to refit in March, 1772, but was killed and eaten by the savages in the Bay of Islands, June 12th, 1772.*

In the latter part of the last century many debates were held in England as to the site for a penal colony, and New Zealand narrowly escaped from this scourge, from the dread of its fierce inhabitants; and in the account of the first settlement at Botany Bay, by Governor Collins, is an account of the visit of the *Dædalus* to New Zealand, after having carried provisions to Vancouver, then on the American coast; this was in 1793.

As early as this period its harbours began to be frequented by whaling-ships, but the intercourse reflects little credit on humanity. There is no account, with one exception, of any white man having lived on it between 1793 and 1814. In the latter year the mutual barbarism and bloodshed, which had attracted much attention, led to the humane endeavour to ameliorate the native character by the introduction of the peace-making doctrines of Christianity. Accordingly, the Rev. Samuel Marsden, colonial chaplain of New South Wales, established a church mission in the Bay of Islands, under the protection of New South Wales, and Mr. Thomas Kendal was appointed resident magistrate. The truthful narrations of this zealous minister will be read with great interest in the volumes of the *Missionary Register* for 1815 and 1816. In the meantime, the great dread of white men against the natives was softening down by the publication of the works by Messrs. Savage,† Nicholas,‡ Kendal,§ Turnbull, and others. Many converts were made, and great activity was used by the missionaries. Among those apparently converts were Hongi and Waikato, two chiefs who were brought to England by Mr. Kendal, and exhibited as Christians at the university of Cambridge. Here they became acquainted, through Mr. Kendal, with the Baron de Thierry, a Frenchman, who conceived the idea of acquiring extensive territories and rights in New Zealand, and Mr. Kendal undertook to become his agent for this purpose, receiving a large sum of money from the Baron. The two chiefs steadily directed their attention, while in England, to the acquisition of fire-arms. Hongi had no sooner regained his native land, than he threw off the garb of christian meekness, and appeared in his true character of a bloodthirsty warrior. He armed his tribe, and commenced a dreadful warfare against his countrymen. The population of the North Island was thinned and scattered, and that of the Middle Island destroyed, with the exception of a miserable remnant. Several other missions were established, but no colonization attempted until 1825, when a company in London sent out an expedition, but it did not form a settlement. Subsequent to this the irregularity of the increasing white inhabitants, and the sanguinary warfare carried on between the natives, required some remedy, and some chiefs requested protection and interference from England. Mr. Busby was then appointed "Resident" at the Bay of Islands, but he had no defined functions. This was in 1831, and in 1835 some chiefs in the North Island,

* *Voyage du Capitaine Marion, Nouveau Voyage à la Mer du Sud, &c., par l'Abbé Rochon, 1783, p. 155, et seq.*

† *Some Account of New Zealand*, by John Savage, Esq., surgeon, London, 1807.

‡ *Narrative of a Voyage to New Zealand*, by John Liddiard Nicholas, Esq., London, 1817.

§ *Missionary Register*, December, 1817, p. 523.

alarmed at the pretensions of the Baron de Thierry, who claimed his right of sovereignty over the islands, and proclaimed his intention to take possession, formed themselves into an independent state, with the title of the "United Tribes of New Zealand." Disorders still continuing, the efficient project of colonization was resumed; it had been first proposed by Cook, and many schemes had been formed by various persons, including Dr. Franklin. In 1837 a society was formed in London, including the names of Lords Durham and Petre, Messrs. Barings, Charles Enderby, Hawes, Lyall, &c., whose plans being matured were submitted to the Colonial Office, but they were discouraged and opposed by the government. In 1839 the New Zealand Land Company was formed, but were unsupported by the government, and consequently were driven to the alternative of "land-sharking," that is, purchasing the sovereignty of the land of the native chiefs. They sent the *Tory* to take measures for commencing the colony on May 12th, 1839, reaching Cook's Strait August 17th, and purchased the South portion of the North Island of the natives. The first detachment of emigrants arrived at Port Nicholson, the site selected, about the end of January, 1840. Others followed soon after. The government had taken means, by following up Cook's claim of sovereignty for the British, by sending Capt. Hobson to the Bay of Islands as consul and lieutenant-governor, and furnished with a staff of civil officers. He established the seat of government at Auckland, in the Shouraka Gulf. Major Bunbury had proclaimed the sovereignty of England in the South and Middle Islands in June, and the British flag was first hoisted, and courts held first, by the late Capt. Stanley at Akaroa. This was but just in time, as *four days* later a French expedition arrived to take possession of Banks's Peninsula as a penal settlement.

Thus New Zealand dates, as a British colony, from May, 1840; then as a dependency of New South Wales. In May, 1841, it was proclaimed a separate colony, under an independent government; the seat of that government being at Auckland.

The New Zealand Company received a royal charter February 12th, 1841, with a capital of £300,000; and with these means they founded, in addition to Wellington in Port Nicholson, the settlement of Petre on the Wanganui, and New Plymouth in Taranaki; a fourth was afterwards added, Nelson, in Blind Bay. The affairs of the company did not flourish, and, from various causes, their efficiency diminished, and, according to an agreement with the government, they abandoned these projects in April, 1850. Such are the particulars of the first colonization of New Zealand. It cannot be entered into more fully here.

It was erected into a British colonial bishopric in 1841.

The islands of New Zealand, as is well known, consist of three principal ones; the two northern of which are separated by a strait, Cook's Strait, varying from 4 to 25 leagues in breadth. The general trend of the land forms an extensive curve facing the N.W. It is from this quarter that the most frequent and the most furious winds blow in this part of the globe, and D'Urville considers that it is to their action, incessantly continued through many ages, that the configuration of the islands is owing. The currents caused by these prevalent winds have so acted on the shores, that in course of time this strait separating the islands has

been formed by them, making a free passage for the constant drift of the ocean to the S.E.

The names by which the islands have been distinguished are involved in some doubt. Cook says, with some uncertainty, that the principal were *Tovy-Poennammoo* and *Eahi-No-Mauwe*. This was afterwards found to be correct, as far as the country on either side of Cook's Strait is concerned. But it is considered that there is some error in the transcription of Cook's manuscript as regards the latter name, which, according to Mr. Kendal, should be *Ika-Na-Mawi*, the name of the South Island being more properly *Kai-Kohoua* (lobster-eaters). The orthography usually adopted is T'avai-poennammoo, or T'avai-pounamou by the French, and Ika-na-mawi.

The NATIVES of New Zealand have been so often described that it is needless to repeat much here. Their ferocity and cannibalism distinguish them, but their many redeeming qualities place them high in the scale of human nature. It may be remarked that, at present, on no part of the coast is the native population stationary; they wander from place to place without fixed habitation. It would appear that there is not now a single tribe, properly so called; but the entire population consists of scattered families, and remnants of tribes, which were nearly exterminated, twenty years since, by the inroads of the Rauperaha and the Kawia tribes, when the latter were driven from the centre of the North Island by the warfare of E Onghi and his followers. The total number of natives, from a close estimate by Mr. Edmund Halswell in 1841, amounted to 107,265. The most thickly peopled parts are North of Poverty Bay, around Wangaroa, and the Bay of Islands. They have been the actors in some dark tragedies since the settlement of their coast by Europeans.

New Zealand is preëminently a volcanic country. In the North Island are seen active volcanoes of great height, and some very singular localities and phenomena are described by Dr. Dieffenbach, existing in its centre. No active volcano is known to exist in the South Island, but the central chain of lofty peaked mountains, rising above the limits of perpetual snow, appears to be of the same character. Earthquakes are of very common occurrence in the vicinity of Cook's Strait, and their frequency and intensity do not appear to have been sufficiently noticed in the accounts of the colony. They have acted seriously on the prosperity of Wellington and other parts.*

The CLIMATE of New Zealand is equable, and is considered to resemble that of the land between the South of Portugal and the middle of France. It is without great extremes either of heat in summer or of cold in winter. Rain appears more generally distributed throughout the months than in the North; there is no distinct rainy season; it is rare for a fortnight to pass without at least refreshing showers. In consequence of this great quantity of moisture the vegetation is remarkably vigorous. One of the productions most interesting to

* Exclusive of the general range of voyages which all more or less contain information as to the natives, the reader will find much interesting matter in a work, entitled *The New Zealander's Library of Entertaining Knowledge*, 1831; Dr. Dieffenbach's *Travels in New Zealand*, 1843, vol. II.; and in Edw. Jern. Wakefield's *Adventure in New Zealand*, 1845. The latter works, too, give a good account of the proceedings of the colonization. The above estimate of the population is given in detail in the Report on the Colonization from Ireland, 1848, pp. 30—43.

mariners is the famous *kauri pine*, or, as it has been called, *cowdy*. Its botanical name is *Dammara Australis*, and its straight and even trunks, sometimes rising to the height of 90 feet before any branches shoot out, furnish some of the most excellent masts in use, and several cargoes have been sent to England for the navy. It is abundant on the hills from Cape Colville to Kati Kati, in the Bay of Plenty, lat. $37\frac{1}{2}^{\circ}$ S., its southern limit. A resinous gum exudes from it, forming large solid masses around its roots, and these masses found in the earth are an evidence of the former existence of forests where none now remain. This resin may be valuable, but is not much gathered.

There is no part of the world, says D'Urville, in which the winds are more violent than on the coasts of New Zealand; and, if they had been known to the ancients, without doubt they would have here placed the court of Æolus. Here, as elsewhere, the winds ought doubtless to be most formidable in the winter months, but seasons will not guarantee the navigator from their attacks. When the weather is apparently the finest, and the sky the most clear, there is no certainty of security. Often when these winds appear to be lulled, they break forth with equal fury either from the same quarter or from the opposite one. In a word, mariners called upon to frequent these parts cannot exercise too much vigilance in their manœuvres.*

Tasman was the first who suffered from the violent gales of New Zealand. Cook, in his excellent examination, more than once escaped destruction. They very nearly caused the loss of Surville, and did not spare Marion; indeed almost every navigator has related some account of their fury, and that, too, during all seasons.

It will be needless to quote here the numerous authors and surveyors who have furnished us with materials for a nautical description of New Zealand. They will be referred to in their proper places.

Before entering upon the detailed description, it may be premised that the three principal islands were, at the time of the proclamation of the British government over the group, directed to be called *New Ulster*, or *North Island*; *New Munster*, or *Middle Island*; and *New Leinster*, or *Stewart*, or *South Island*. The first appellations in this proclamation have not come into very general use, neither have the native names, from their length. We commence with New Ulster, or

THE NORTH ISLAND.

The **THREE KINGS**, or **MANAWA TAWI**, are the northernmost appurtenance to New Zealand. They were discovered and named by Abel Tasman, on January 6th, 1643, as previously noticed. The principal of the group is in about lat. $34^{\circ} 13'$ S., and lon. $172^{\circ} 10'$ E.

These islands have a barren aspect, are of moderate height, and may be seen on a clear day at the distance of 25 miles. They lie in an angular position, in a North, South, and East direction. The eastern island is the longest, and may be a mile in length; the other two are about equal, both in size and height, and may

* D'Urville, vol. ii. p. 337.

be about a quarter of a mile long. At the S.E. end of the western island, adjoining, are several high rocks, which, at a distance of 7 or 8 miles, have the appearance of separate islets; these rocks extend 5 or 6 miles to the E.N.E., with the sea breaking a little without them.

On the eastern side of the largest of these islands there is reported to be a small sandy bay, where a boat may land in fine weather. There are good springs of fresh water, some goats, and abundance of wild celery. These islands do not appear to occupy more space than 8 miles from North to South, and nearly the same from East to West. There is no danger to be apprehended at the distance of 2 miles on the South side, as they were passed at that distance.

A current was experienced off the islands, setting S.S.W., at the rate of 3 miles an hour. The day previous to making the land a strong current appeared to set from the N.W.*

Capt. FitzRoy says, while in sight of these islets, on New Year's day, 1836, he passed through several tide-races, one of which was rather heavy, and would have been impassable for a boat. These races moved toward the North while they could trace their progress. The temperature of the water fell 6° after passing through the principal one. The next day it was found that the ships had been set as much to the southward, so that it was inferred that they were regular tide streams rather than constant currents.†

The northern extremity of the North Island of New Zealand consists of a peninsula united to the main island by a long sandy neck.

CAPE MARIA VAN DIEMEN is its N.W. point, and the direction of the North coast of this portion, between this cape and Cape Otou, the N.E. point, is E. by N. It is steep, and of moderate height. The northern part of the island is included in the native district of *Kaitaia*. Cape Maria Van Diemen, according to D'Urville in lat. 34° 27' S., and lon. 172° 36' E., is composed of detached rocks, of a hard conglomerate. Inland of this rocky cape the land is sandy, and sand hills run for a distance of about 4 miles along the coast to the eastward, when the shore again rises into cliffs. The sand, driven by strong westerly gales, which prevail here during a great part of the year, has made great encroachments on the land, and, in fact, has nearly overwhelmed the whole of it. The sand hills near the cape are separated by swampy valleys, from which streamlets descend into the sea. On the banks of these the very few natives rear their provisions.‡

REINGA, a spot held sacred by the natives, lies somewhat to the eastward of Cape Maria Van Diemen; it forms one extremity of a cliff of conglomerate rock, which cannot be approached from the sea-side, and which lines the coast for about 6 miles, and terminates to the eastward in a conical hill, *Te-wanga-ke*, whence the coast is lined by a sand beach, to about the middle of the northern shore. It is here that the New Zealander believes there is a cave or passage through which the departed descend into the nether regions, placed at the limit (*Te-muri-wenua*, or land's end) of the world as known to them. The cliff above mentioned is the escarpment of a steep and narrow ridge of moderate elevation,

* Journal of New Zealand, 28th March, 1829.

† Voyage of the *Adventure* and *Beagle*, vol. ii. p. 621.

‡ Dieffenbach, vol. i. pp. 198-9; D'Urville, vol. ii. p. 358.

which runs inland towards the Harbour of Parenga, presently described, and is not connected with the principal chain of mountains. Off this part of the coast is the *Columbia Reef*. In former ages the kauri pine grew abundantly here, but it is now nearly extinct; the destruction of the forest has allowed the sand to encroach, and has sealed the doom of this portion of the island. About halfway between Parenga-renga and the western coast there grows a puriri tree, half buried in the sand, which serves as a landmark to the natives, around which the sand has accumulated many feet within their memory.

From Manga-ke the North coast sweeps again in an open bay for some miles to the eastward. The eastern extremity of this bay is formed by a rocky peninsula, insulated at high water, which was formerly the stronghold of the Hapouri tribe. A narrow valley here opens to the sea; through it flows a rivulet, which winds between rocks overturned and broken in a most remarkable manner. The highest of the hills, called *Hairoa*, is visible at some distance from the eastern coast, and an arm of the estuary of Parenga-renga extends to within 3 miles of its base. Near its summit, which is quite pointed, is a vault, which serves as a frame through which to view the surrounding country. The whole of this place is called by the natives Kapo-wairua (a spirit which has become night, or is annihilated), and its inhabitants were destroyed about twenty years since. The coast hence to the North cape is very rocky, alternating with small sandy bays. The general aspect of the coast here is that of steep cliffs undermined by the sea, and their summits terminating in a sort of even table land. *Otake Point*, the principal projection between the two capes, has a similar aspect. As must be evident, all the bays and anchorages on this part of the coast must be exposed to the North.

CAPE OTOU, or NORTH CAPE, is in lat. $34^{\circ} 24' S.$, and $173^{\circ} 1' E.$ * It forms part of a peninsula of 5 or 6 miles in circumference, named by the natives *Moudi-wenua*. The promontory itself is high and bold, presenting very steep sides to both the North and East coast; but a flat and swampy land of about 3 square miles in extent runs from the northern to the eastern coast, and separates this promontory from the hills at Kapo-wairua. The cape itself may be seen at 8 or 10 leagues' distance.

Moudi-motou, a small island, lies off the eastern part of Cape Otou, and is connected with it by a chain of rocks even with the water's edge. Marsden and Nicholas extol the beauty of the country, and the excellent cultivation in the neighbourhood of this cape.†

The eastern coast, from the North cape, runs S. by W. for the distance of about 6 miles, to the Harbour of Parenga-renga. It is formed by frightful perpendicular cliffs of volcanic conglomerate. In some parts there are cliffs of a reddish crumbling loam, which is very fertile land; in others is a hard gray sandstone, in which Dr. Dieffenbach found a small layer of good coal.‡

PARENGA-RENGA does not appear upon any of the early charts, although it is an extensive inlet. It is in about lat. $35^{\circ} 35' S.$, and lon. $172^{\circ} 57' E.$ § The har-

* D'Urville, vol. ii. p. 360.

† Marsden, *Missionary Register*, December, 1816, p. 518; Nicholas, vol. ii. p. 210.

‡ Dieffenbach, vol. ii. p. 205.

§ *Ibid.* p. 208.

bour, or estuary, as it should be more properly called, is from 6 to 8 square miles in extent, and sends several branches in different directions, for some distance inland, all which are navigable for boats at high water. Good land is situated at the head of these channels; one of these is only a short distance from Kapowairua, on the northern coast. The best anchorage in the harbour is within the inner northern head, where there are 5 fathoms water.

The northern head of Parenga-renga is a black water-worn bluff, by which the entrance is easily distinguished, as the southern head is a spit of dazzling snow-white sand, which stretches toward Mount Camel along the coast, and extends for some miles inland. The entrance to the harbour is narrow, but is 2 fathoms deep at low water. The tide rises 10 feet. Dr. Dieffenbach adds that, in standing out of the harbour, during the ebb tide, he observed some rocks in the entrance, about 6 feet under water; the entrance should be therefore carefully examined before entering.

SANDY BAY, the extensive gulf which is formed by the coast to the southward of that just described, was also named by Cook; he found bottom in it at a great distance off the land.* Its S.E. limit may be taken as being at Cape Kari-kari.

MOUNT CAMEL, or OHOURA, or *Houhoura*, is remarkable. Its first appellation was given by Cook. It stands isolated, in the midst of low land, bordered on the coast by the sand downs previously mentioned, the dazzling whiteness of which fatigues the eye. The land itself consists of low hills or swamps, and is almost useless on this coast, where it is lined by this long sandy beach, here and there interrupted by bluffs of basaltic rock, which are verdant with groups of the hardy pohutukaua tree.

Mount Camel itself is not connected with any chain of mountains, but forms an isolated hill, and rises to the height of about 500 feet above the sea. It has been erroneously called Mount *Carmel* by many late writers. This mountain protects a deep inlet, which at its head branches off into several shallow channels, and forms a perfectly sheltered harbour for vessels of the largest burden, with anchorage close to the eastern shore; the entrance to this harbour is not more than 40 or 50 yards broad. On the top of the mountain, and to seaward, the hilly group forming it is barren, although from the resin found there is unequivocal proof that it was once covered with kauri. Towards the harbour the natives have cultivated portions of the steep ridges; these plantations alternate with pleasant bushes and groves to the water's edge. They say that once a very large vessel entered the harbour; and although the surrounding country is not a favourable district for colonists, this harbour may afford shelter to vessels which draw too much water to lie with safety in the Bay of Rangaunu, to the southward. This portion of the coast of New Zealand is that of the long sandy neck which connects the northern portion with the main island, as before alluded to.

KARI-KARI, or KNUCKLE POINT, forms the S.W. point of Sandy Bay, and is an offset of a hilly ridge which separates Doubtless Bay from Sandy Bay. These hills are low, covered in some places with a little wood, in others with fern.

* Cook's First Voyage, vol. iii. p. 167.

DOUBTLESS or LAURISTON BAY, the OUDOU-UDOU of the natives, received these names from Cook and Surville, who, singularly, were here at the same time, without knowing of each other's presence. Surville anchored here in the *St. Jean Baptiste*, December 17th, 1769, and named it Lauriston Bay, after the name of Governor Laws. He experienced a violent storm while on shore, in a cove which he named *Refuge Cove* (*Anse du Refuge*). Here he was received with the greatest kindness and hospitality by the native chiefs, which, unhappily for the credit of humanity, met with but a sad recompense, for on his departure he took his friendly host, bound a prisoner, with him, and set fire to the houses and villages, and burnt all the canoes on the beach. This unprovoked attack led to the disastrous result of the murder of the unfortunate Capt. Marion, who came into the Bay of Islands afterwards.

The following account is from Dr. Dieffenbach's work. The first place which claims our attention in Lauriston Bay is *Oruru*, where a river, which takes its rise in the eastern slope of *Maunga Taninva*, and which can be entered by a boat, empties itself into the sea. A similar valley lies 8 miles North of it, and another river here falls into the sea. The road from *Oruru* to *Mango-nui* is on a succession of steep hills and narrow fertile ravines.

MANGO-NUI HARBOUR did not appear on the charts. Vessels rounding *Point Surville*, the South point of the bay, should keep close to the southern shore of the bay, and will then have no difficulty in avoiding a reef of rocks which runs off *Oruru* in a north-easterly direction, and which is the only obstacle to a safe and easy entrance into the harbour. The channel is not above 100 yards wide, but is very deep. Several whalers have at different times resorted to this harbour for provisions and repair. In the narrow part of the channel a vessel can keep close to the southern shore, and, entering the basin, haul close round the southern head, and anchor in 5 fathoms water, about a quarter of a mile off that head, where a small number of vessels are perfectly sheltered. The rest of the estuary is a large basin, spreading out into mud flats at low water, with a channel sufficiently deep for large boats, near the northern shore, up to its head, which is here entered by a river that takes its rise in the hills separating the harbour of *Wangarou* from *Mango-nui*. An arm of the latter stretches towards *Oruru*, and unites with this river behind an island of moderate size, which forms the head of the harbour. This island conceals mangrove flats, which lie on both sides of the channel. The North side of the harbour is hilly; the southern head is a narrow peninsula, with table land on the top; towards *Point Surville* the coast is also hilly, with occasional narrow valleys, most of which are wooded toward the sea-coast. There are, or were, about thirty Europeans living in this harbour, chiefly sawyers and storekeepers, and a few natives. *Mango-nui* is well situated for a small town.*

Commander Hayes, who visited this place in *H.M.S. Driver*, says:—"In running into Doubtless Bay for *Mango-nui* Harbour it is advisable to keep between the port shore and two rocks that always show above water, as there is a reef of rocks beyond them. The entrance is narrow, but there is no danger if you keep

* Travels in New Zealand, vol. i. p. 210.

a little on the starboard side of mid-channel, and run boldly in, and come-to in 4 fathoms, in the cove on the starboard side. There would be room for two steamers like the *Driver*. If you do not like going in, good anchorage will be found just outside. On the North side of the bay, outside this little harbour, on the beach, are some veins of *coal*. It was dug down about 8 or 10 feet, but was harder and blacker at the surface than at that depth; it would not burn. The rocks here, as well as from Auckland towards the North Cape, are covered with delicious oysters.

"In Mango-nui Harbour the tides are moderate; rise and fall about 7 feet; sheltered from all winds but N.W. There is a small flagstaff on the North head going in."*

WANGAROA BAY.—From Point Surville to the entrance of this harbour the coast is clifty and steep, consisting of fragments of volcanic rock, very firmly cemented together into conglomerate. The entrance into Wangaroa Harbour is formed by towering perpendicular rocks of the same description, and is only 150 yards broad. Pohutukaua and other trees overhang these black walls, and form a very picturesque contrast with them. The entrance looks as if the solid rocks had been rent asunder by an earthquake, and the steep opposite sides had undergone a continued friction before they parted. Deep fissures penetrate the coast, and high cubical masses are piled one above the other in-shore, to the height of several hundred feet. The most remarkable is *Waiki*, or *St. Peter*, a cluster of these solid rocks on the northern head. The water in the entrance is of great depth close to the rocks, and there is no sunken rock or other hidden danger below the surface. Nearly opposite Waihi a dome-like elevation crowns a pyramidal hill, called *Hakiri*. To the northward are the hills which separate Wangaroa from Mango-nui, and which are called *Tara-tara*. The South side of the harbour is likewise rocky and much fissured. The harbour itself is very spacious and deep, possesses anchorage for the largest fleet, and is sheltered from all winds. As a harbour it ranks with the best in New Zealand, and is sheltered from all winds. There is, however, but little available land in its immediate vicinity; kauri timber grows on the neighbouring hills, but all that near the sea has been cut or destroyed. Several vessels have been here laden with it, and craft of small burden have been built here.†

The DIDI-HOUA ISLANDS lie to the north-eastward of the entrance of

* Nautical Magazine, September, 1847, pp. 469—470. In the "Southern Cross," Auckland, November 13th, 1849, it is stated that fifty-four whalers, besides other vessels, have satisfactorily refitted here within the last two years. A resident will pilot any in who wish it.

† Dieffenbach, vol. i. p. 235. Wangaroa was the scene of a dreadful tragedy in 1809, the massacre of the crew of the *Boyd*, an event well remembered in New Zealand. This vessel, of about 500 tons, left Sydney under the command of Capt. John Thompson, taking with them two New Zealanders, chiefs in this district, as sailors. One of them, George, was sea-sick, and incapable of duty; this irritated the captain, who not only treated them with great indignity, but caused him to be flogged. His revenge was a terrific one. With a singular temerity, the *Boyd* was taken into Wangaroa, and the chiefs dismissed. The natives collected, and hearing of George's wrongs, murdered the captain and boat's crew immediately on their first landing, and then proceeded to the ship and destroyed all on board but four, who had concealed themselves until the savages were satiated with slaughter. Their bodies, nearly seventy in number, were then eaten, and the ship burnt to the water's edge. The particulars of this awful retaliation for unjust treatment, a warning to commanders, will be found in "Nicholas's Voyage to New Zealand," vol. i. pp. 144, *et seq.*

Wangaroa, and are a capital mark for making that port. They also add to its security, for there is excellent bottom for anchorage everywhere between them and the coast. They are two in number, steep, bare, of moderate height, and 2 miles in extent S.E. and N.W. The passage to the S.E. appeared to D'Urville preferable to the other. The island projects into breakers on that side.

At 5 or 6 miles to the East of Didi-Houa is a group of about fifteen islets of 4 miles in extent, the largest of which, not more than 3 or 4 miles in circuit, is called *Motou Kawa*, and the next, very much smaller, is named *Panake*. They are the *Cavallos* of Cook, and called the *Kava-illi Islands* on the Admiralty chart. They are, or were, both inhabited; in 1795 the first was governed by Tea-Wariki, and the second by his son.*

Between this group and the land there is a channel scarcely half a mile wide, only practicable for small vessels. M. Blosseville states that you may anchor in 8 or 9 fathoms under the largest of the islands.†

At 16 miles E. by S. from the entrance of Wangaroa is *Point Ngatoka-Rarargui*, which may be recognised by three rocks lying under the land. At 4 miles farther on is *Cape Wiwika* or *Wivia*, one of the entrance points of the Bay of Islands. Against this cape are three small islets, the outer one of which, called *Tiki-Tiki*, is only a black rock, bare, and placed on-end like a pyramid.

The BAY of ISLANDS, during all the early intercourse of Europeans with New Zealand, was the principal rendezvous in the group. But since the establishment of other settlements this has proportionately declined, though its many natural advantages will still cause it to maintain some importance.

The opening of the bay is not less than 10 miles in extent between *Capes Wiwika* or *Pococke*, and *Rakaou* or *Bret*, and it has an average depth of 8 miles. It would have but little shelter, from its being open to the N.E. winds, if it were not from the numerous islands and peninsulas dispersed throughout it, and forming excellent anchorages.

Off Cape Wiwika is an island called the *Sentinel*; and outside of this again is a smaller one, a conspicuous rounded rock, about 40 feet high, called the *Nine Pin*.

On the North side is the small cove of *Ranghihoua*, very commodious for small vessels. Then comes the *Tepahi* or *Tippahi Islets*; next the Port of *Té-Paona*, much better sheltered than the preceding; on the western shore the *Kidi-Kidi River* follows, unpracticable for ships, but exceedingly useful for canoe communications with the interior. The island of *Motou Roa*, with the naked islets to the East of it, lies to the S.E. of the entrance. To the South of this is the *Favorite Bank*, surveyed, as has been the whole of the bay, by M. Le Plain, in 1831. To the South of this is the mouth of the *River Waitangui*; then, to the South of this, is the mouth of the *Kawa-Kawa River*, ~~that~~ of *Waï Kadi*,‡ a projecting peninsula, forming good anchorage in its western side, in the *Bays of Kororareka* and *Mata-Ouwi*, and which terminates in *Points Tapeka* and *Wayhihi*. To the East of this is *Pa Roa Bay*, fit only for boats; but Port

* Cook's First Voyage, vol. iii. p. 149; D'Urville, Voyage de *L'Astrolabe*, vol. ii. pp. 194-5, 362.

† Blosseville, p. 7.

‡ Voyage of Richard Cruise, p. 35.

Manawa, to the East of this again, is very safe and commodious for vessels not exceeding 300 or 400 tons, for the sand-banks off its mouth prevent the approach of larger vessels. Another and very narrow peninsula separates Manawa Bay from *Rawiti Bay*, where Marion first anchored. This forms an extensive basin, sheltered from the winds from the offing by the Islands of *Motou-Arohia*, *Motou-Doua*, *Motou-Kiakia*, and a crowd of others, which caused Cook to apply the name to the bay.*

During the recent colonization of New Zealand there was considerable discussion as to the eligibility of the site of its future capital, and one of these sites was that of *Russell*, North of Paheha, which was named as the temporary seat of government, but which was deserted at the erection of Auckland as the capital. Its population in 1846 was 534.

PAHEHA, or PAHIA, is, or rather was, the principal episcopal missionary establishment. It is pleasantly situated on the bay opposite Kororarika. It is too much exposed to afford a good harbour for shipping; but as it is the most favourable side for communication with the interior, the advantages and disadvantages of the position are nearly balanced.

KORORARIKA may be termed the principal commercial settlement in the bay, but scarcely deserved the name of a town in its early days. It then consisted of about twenty poor houses, and numerous shanties, inhabited by a low and lawless race, and acquired the cognomen of "Blackguard Beach." A small town sprung up, but the difficulty of land communication was a serious drawback to it. But in 1845 it was totally burnt and plundered by the natives, during John Heké's rebellion.

As has been before observed, the number of whaling and other vessels coming hither for refreshment very much decreased on the regular colonization of New Zealand. This was chiefly owing to the increase of Europeans, who consumed the scanty produce of the region.

The number of natives, estimated in 1841 by Mr. Halawell as living in the neighbourhood of Kororarika, was 3,700; and up the Kawa-Kawa many Europeans had erected humble-looking dwellings, with many English adjuncts, looking homely and pleasant, but the whites almost entirely abandoned it since the devastation caused by Heké's rebellion.

The first description we will give is that contained in Capt. FitzRoy's volume of the *Voyages of the Adventure and Beagle*.

Few places are easier of access than the Bay of Islands; excepting the Whale Rock, whose position is well ascertained, there are no hidden dangers; and within the line of the heads there is little or no current deserving notice: outside that line the current generally sets to the S.E. about a mile an hour.

Compared with mountainous countries, the northern parts of New Zealand are not high; but they cannot be described as low land. Perhaps the expression "moderately high land" may convey an idea of such as is more than 200, but less than 1,200 feet above the level of the sea, which are the limits I have in view. In distant profile the land inclines too much to regular and convex outlines

* See D'Urville, *Voyage de L'Astrolabe*, vol. ii. pp. 363—365.

to be picturesque. It is only along the sea-coast that steep cliffs, and a more broken boundary, cause enough variety to please the eye of a lover of landscape. Approaching nearer, the interior of the country, varied by hill and valley, with an agreeable mixture of woodland and elevated ground, makes a favourable impression upon the mind, from the natural association of ideas of capability and cultivation; but whether it pleases the eye, as a picture, must depend probably as much upon the kind of scenery lately viewed as upon preconceived ideas. With us the recent impressions caused by Otaheite rendered the view of New Zealand, though novel, rather uninteresting.

Cape Bret is a bold promontory, higher than any neighbouring land. When first seen from a distant offing, while no other land is in sight, it makes like a quoin shaped island. As the sea around is free from danger, it is an excellent landfall for shipping approaching this part of the coast. Detached from, but near the cape, is the rock with a hole or archway through it, named by Cook Piercy Islet.

Point, or rather Cape, Pococke, is a steep cliffy headland, of a dark colour, rather picturesque in its appearance; near it there is a conical rocky islet. Numerous islands, small and large, are scattered over the bay, an expanse of water really about 19 miles square, though to the eye it appears much smaller, because so many islands intercept the view.

Near the middle of the West side of the bay is the opening of Kororarika Harbour, a secure but shallow port; better adapted to merchant shipping than to the use of men-of-war.

After passing Cape Pococke, and advancing about a mile, a small settlement appeared in the northern bight of the bay; and the English look of the houses was very gratifying to us. This, I found, was Tipuna, or Rangihoua, the place where the first settlement of white men was made upon the shores of New Zealand. On the farther side of Kororarika other houses were then seen, neat and apparently comfortable dwellings, well-situated under the lee of the western hills; while close-by, on our right hand, a curious line of flat-topped black rocks, a few feet only above the water, reminded us of the remains of a great mole.

Within the line from Cape Pococke to Cape Bret there are not more than 30 fathoms of water; and everywhere, excepting close to the rocks, the bottom is soft and tenacious, so that an anchor may be let go in any part.

In a conspicuous solitary position, opposite to the entrance of Kororarika Harbour, a single house, without any other building within a mile of it, nor any protection except that of a tall staff, on which waved the British union jack, presented a contrast to the fortified villages, and forcibly impressed one's mind with a conviction of the great influence already obtained over the formerly wild cannibals of New Zealand.

The entrance to the harbour is narrow, even to the eye, but it is still more confined by shoal water. In entering or leaving it, a ship ought to keep close to Kororarika Point; after rounding that point, at the distance of a cable's length, the sheltered part of the port is seen, looking like the mouth of a navigable river. On the western side, the native village of Kororarika, a straggling collection of low huts, strongly palisaded; on the eastern, three or four English houses, the

head-quarters of the missionaries ; on the rising ground near the water, far up the harbour, several more houses and villages, gave an appearance of population and successful exertion as surprising as satisfactory.

We anchored between Kororarika and Paheha (the missionary settlement) ; farther up the harbour were several whale ships, which had anchored there, I was told, in order to avoid the spirit shops of Kororarika. From this anchorage the view on all sides is pleasing. An appearance of fertility everywhere meets the eye ; but there are no grand or very remarkable features. There is nothing in the outward character of the country corresponding to the ferocious, sanguinary disposition of its aboriginal inhabitants.*

The Admiralty plan is derived from the French survey made in the *Astrolabe*, under Capt. La Place, 1830—1832. In the narrative of that voyage the following account is given of it by M. Paris, the surveyor :—

The Bay of Islands contains numerous anchorages, which are more or less frequented by Europeans. The extensive Harbour of Manawa, where the first navigators stayed for refreshment, has become a solitude, especially since the English missionaries have been established in the River Kawa-Kawa, and have contributed, by their presence, to unite the scattered remnants of the numerous tribes which Cook and the unfortunate Marion found scattered around its shores.

The River Kawa-Kawa, where *La Favorite* anchored, being in the western part of the Bay of Islands, it will be perhaps useful to say a word on making the bay, and the different remarkable points it offers. Among the latter the *Sentinel* is incontestably the best. This islet may be seen at a great distance in the offing, and cannot be confounded with the lands behind it. Its isolation, its form somewhat like that of a buoy, its blackish colour, makes it easy to be recognised. Thus I think this is the point which ought to be made out in approaching the Bay of Islands.

The aridity, the wild aspect of the coast near Cape Bret and Point Pococke, also the large opening comprehended between these two projecting lands, serve equally well to distinguish the bay ; because the coasts farther to the North are covered with wood, and present no indentation : to the South, too, the bare summit, and the whitish flanks of Cape Bret, may be seen several leagues.

The whole extent of the Bay of Islands is clear ; although large it is good, and a ship could at any time wait for a fair wind to go to sea, provided she took shelter between the islands which give the name to the bay.

The *River Kawa-Kawa* is a long, irregular channel, containing several good anchorages ; it is rather an arm of the sea penetrating into the land. *Motou Roa* and the *Black Islets* protect it from northerly winds. You may anchor to the South of these islands, and then be in a good position to get under way with northerly winds ; but the place where water is procured is too far off.

The two points which form the entrance to the Kawa-Kawa are in a line North and South, about a mile apart, from the extremity of the rocky bank off *Wayhihi Point*.

The western part of the river is open to winds from N.W., and coasters only

* *Voyages of the Adventure and Beagle*, vol. ii, pp. 564—566.

can anchor under the shelter of *Motou Maire Island*, lying before *Paheha*, the missionary establishment. Thus large ships anchor on the eastern side, and are there protected by *Point Mangui Manguinouï* from winds outside. This is an excellent anchorage; the depth varies from 20 to 30 feet, muddy bottom; and watering is easy at a neighbouring stream, and provisions may be got from the village of Kororarika. You can anchor farther to the S.E. in the middle of Kidi-Kidi Cove; but you will then be too far from the watering-place, and beyond the reach of the boats sent to the shore.

To the South of *Motou Maire* the river is enclosed between the Islet *Motou Rangui* and the small Peninsula of Toké-Toké, which are only a cable's length apart: higher up the river forms a basin, in the middle of which there are 5 and 6 fathoms, mud, and near the shore less depth. But between Toké-Toké and Point Oôpaa-Noni the shore is much steeper than on the western side.

To enter into the Kawa-Kawa you must leave the Sentinel behind, keeping it to N.N.W.: and when once past, on the West side the mouth of the Kidi-Kidi, and on the East the Port of Manawa, you reach the Black Islets, thus named, probably, on account of their colour.

To the S.E. projects *Point Wayhihi*, a high, rocky promontory, embanked with sunken rocks, on which the sea constantly breaks with fury. They may be, and they ought to be, approached to 5 or 6 fathoms; that is, within half a cable's length, when entering or leaving the river: it is impossible to range around Point Mangui Manguinouï at less than 100 yards; but the western side does not offer the same security, and its gloomy appearance seems to show that there is a formidable shoal not far from it. In reality, *Point Manoworoa* is entirely formed of marshes and flat rocks, a part of which uncover at low water; and the other part, projecting with a gradual slope to seaward, terminates in a hard sand-bank, to which the name of the Favorite Bank was given.

There is nothing to indicate the proximity of the bank: the soundings do not begin to decrease until you are within 2 cables' length of the edge, and it suddenly drops from 40 to 14 feet water, muddy bottom: for this reason it has been serious to many European ships.

There is scarcely any danger to a vessel in the Favorite Bank, except in beating in, and then it is less so by taking short boards. Thus, at the termination of a violent northerly gale, we got under way to go out of the river; we tacked boldly in the middle of the breakers on the rocks off Point Mangui Manguinouï, while we very cautiously approached this bank, on which the sea broke like as if on a bar.

The best leading marks for avoiding the Favorite or Brampton Bank are, the Kairaro Islet brought in a line with Point Mangui Manguinouï, and Point Pococke on with the eastern extremity of the Black Islets. These two marks need only be used one after the other. Thus, for example, if you tack to enter the Kawa-Kawa, you must not get to West of the first of them, which besides is easy to preserve, for the Kairaro Islet is easily made out, and clears very well from the bottom of the Kidi-Kidi Cove. As soon as the middle of *Motou-Arohia* is brought on with Point Wayhihi you need no longer attend to this mark, which would make the tacks too short, but take the second, by

means of which you can run within a short distance of the West shore of the River Kawa-Kawa, where there is no danger. If you run so far to the West as to bring the Sentinel on with the East extremity of the Black Islets, you will be much too near the bank.

Vessels of the largest tonnage may enter the River Kawa-Kawa. Before Kororarika the depth is 20, 30, 32 feet, muddy bottom near the shore, and gravel farther off.

The observations of *La Favorite* were established on *Kairaro Islet*, and M. Serval observed its position as lat. $35^{\circ} 15' 2''$ S., lon. $174^{\circ} 9' 2''$ E. The variation was $11^{\circ} 30'$ E., and a tide gauge fixed on the same islet gave the establishment of the port as $0^h 20'$; the greatest rise and fall, 6 feet 6 inches.*

CAPE RAKAOU, or RAKOU-MANGA-MANGA,† or CAPE BRET, as it was named by Cook, after Sir Piercy Bret, is considerably higher than any part of the adjacent coast; at the point of it is a high round hillock, and N.E. by N., at the distance of about a mile, is a small high island or rock, which, like several, is perforated quite through, so as to appear like the arch of a bridge. This is called *Piercy Island*. The cape is in lat. $35^{\circ} 10'$ S., lon. $174^{\circ} 22'$ E.

The interval of coast between Cape Bret and Bream Head, the N.W. point of Hauraki or Shouraka Gulf, a distance of about 45 miles, is not very accurately described, and requires farther elucidation. To the S.W. of Cape Bret an indentation running to the S.W. is called *Wangaruru Harbour*; it is good, and until recently was considered as not having water enough to admit any other vessels but canoes or boats.

Wangaruru Harbour, about 10 miles to the southward of Cape Bret, is a very good harbour, in which H.M.S. *Buffalo* (a store ship) took in a large cargo of spars in 1834.

The *Eliza Reef* lies some distance off the shore, at about 10 miles South of Wangaruru; and eastward of this again is a rocky group called the *Poor Knights* by Cook, the *Tawiti Rahi* Islands of the natives. They are rugged, and of moderate height, extending about 3 miles North and South, their North point being in lat. $35^{\circ} 28'$ S., lon. $174^{\circ} 45'$ E. This rocky ridge appears to continue to the S.S.W., for in this direction two heads (at least) show themselves; the first called *High Reef*, and the outer the *Sugar-loaf*, about 3 miles from the Poor Knights.

TUTUKAKA HARBOUR, which is 16 miles southward of Wangaruru, is a safe harbour for small vessels, with deep water and a bold shore. As these last harbours do not yet appear to have been properly described, little can be said of them more than that they will afford sufficient shelter for vessels of considerable burden in passing along the coast.‡

HAURAKI or SHOURAKA GULF.—This very extensive bay has sprung into great importance by the colonization of New Zealand, inasmuch as the northern capital, Auckland, has been established on one of the numerous harbours it contains. Like most other parts of the coast, we owe our first knowledge of its

* Voyage of *La Favorite*, 1830—1832, tome iv. pp. 170—174; Observations by M. Paris.

† D'Urville.

‡ Information relative to New Zealand, 1839, p. 21.

nature from the first voyage of Cook in 1769, but his examination was confined to the great river, the Wai-Kahow-runga, or the Thames as he named it, which falls into its S.E. angle. All its western part remained comparatively unknown until as recently as 1827, when the lamented D'Urville entered and surveyed its S.W. parts in the *Astrolabe*, giving the name of his vessel to the strait formed by the islands in its southern part, a name now superseded by the native one of Tehmaki. In drawing up this account, then, we have had recourse to the First Voyage of Cook; the Voyage of the *Astrolabe*, vol. ii.; to Dr. Dieffenbach's Travels; to those of Mr. E. J. Wakefield; to the observations of Sir E. Home; and those of Mr. David Rough, the harbour-master of Auckland.

CAPE TEWARA, or BREAM HEAD of Capt. Cook, forms the N.W. limit of the Hauraki Gulf. This remarkable headland is high, and rugged in the extreme, formed of large fragments of basaltic rock, piled up in most fantastic forms, which vary their appearance as the ship passes them. It is about 15 miles South of Tutukaka, in lat. $35^{\circ} 51' S.$, lon. $174^{\circ} 35' E.$

WANGARI BAY is formed by the peninsula of which Cape Tewara is the S.E. point. Its southern face extends $4\frac{1}{2}$ miles in a W.S.W. direction, where the entrance to the river runs to the N.W., and the main coast trends to the southward.

A considerable bank, which extends a mile from the sandy beach, narrows the mouth of the River Wangari on the West side, so as to leave an anchorage not more than half a mile wide. Its interior offers an excellent anchorage in all parts, and the South wind, which alone can enter it, cannot send in any swell, on account of the configuration of the coasts. Along the high land, toward the North, there are 9 to 11 fathoms nearly touching the shore. The entrance of the river itself is half a mile broad, and then opens into a large basin 2 or 3 miles wide, where large vessels can doubtless enter.

CAPE PAPAI-OUTOU is the southern limit of Wangari Bay, and is nearly 10 miles South, *true*, from Cape Tewara: the coast between is low and bare, and to the South of it is a series of even downs, and nearly bare of trees until within 4 or 5 miles of Cape Rodney.

The MORO-TIRI ISLANDS, or the HEN and CHICKENS of Cook, lie off Wangari Bay. They form a narrow and rugged ridge, and to the South of them is *Taranga Island*. Capt. Cook, who passed here, and caught a large number of sea-bream, November, 1769, says that Bream Bay and Head, as he calls Wangari Bay and Cape Tewara, may be known by these Hen and Chickens, one of which is high, and terminates in two peaks.*

In steering for Auckland from the northward, the Taranga and Moro Tiri Islands may be passed on either side. Coasters invariably take the inner passage.

POINT RODNEY, so named by Cook, is the termination of the line of low and sandy coast trending from Wangari Bay, and from it it trends in an irregular S.W. direction. The land here becomes higher, and has a less barren appearance. The point is not high, and within it, at 4 or 5 miles' distance, it is surmounted by

* Cook's First Voyage, vol. i. chap. 4; D'Urville, vol. ii. p. 150.

a peak of 900 feet elevation. *Point Takatou-Fenoa* forms a projecting point to the southward of Point Rodney, and to the S.W. of it are several islands fronting the coast, which trends regularly 13 miles to the entrance of *Kiahow Harbour*, a large inlet, penetrating the coast in a northerly direction, the head of which is very shallow, but leads to some extensive forests, where excellent spars of kauri pine have been procured.

Off Point Takatou-Fenoa is the Island of *Motou Takewau*; on its western side valuable copper mines have lately been opened (1845). A creek running into the island on that side forms an excellent harbour. Where reefs appear on the Admiralty chart there is really good anchorage, as they only extend a very short distance off shore.

Between Takewau and Point Takatou-Fenoa there is a good passage. A rock, which can always be seen, lies in the centre of the passage, bearing about S.S.E. from the point. The *Flat Rock*, off the East side of Motou Takewau, can be seen from a vessel's deck at several miles' distance.*

TIRI-TIRI MATANGHI ISLAND is low and covered with brushwood; it lies off *Point Hangaprava*, or *Wangaprava*, which is moderately high, with rushes off the North side of it, on which the sea breaks. It is the extremity of a long, narrow peninsula, connected by a very narrow isthmus. The channel between the island and the point, 2 or 3 miles broad, is clear, its depth regularly decreases, and it has plenty of room to work through.

On the East side of Tiri-Tiri Matanghi, at the distance of about $1\frac{1}{2}$ miles, is a very dangerous rock, having about a foot on it at low water, springs, and 15 fathoms close to it on all sides; from it the South end of the island being S.W. $\frac{1}{2}$ W.; a white rocky islet at the N.W. extremity, N. by W. $\frac{1}{2}$ W.; centre of the Little Barrier Island, due North; and the Peak of Rangi-toto, S. $\frac{1}{2}$ E. A red buoy with a white head has been placed on the North side of it, but it is liable to be washed away.†

RANGI-TOTO, the westernmost of a group of islands, about 10 miles South of the former island, forms the N.W. entrance to the road of Auckland. It rises slowly from the sea to the height of 920 feet. In its centre is a very perfect crater, about 150 feet deep. In clear weather it can be seen soon after passing Shoutourou. In working up towards Rangi-toto it is advisable not to stand too close to the main shore, for reefs extend for a short distance from some of the points; with southerly winds vessels may safely anchor outside.

The following remarks were made by Sir Everard Home, Bart., H.M.S. *North Star*:—

The Island of Rangi-toto cannot be mistaken; it is to be known by two points which stand upon each side of the peak which forms the apex of the mountain, and have the same appearance whichever way they are viewed. Under this island there is good anchorage all round; proceeding towards the town a signal-station will be seen upon the top of a remarkable hill called *Mount Victoria*, which is left on the starboard hand, passing to the left of a red buoy

* Mr. D. Rough, October 23rd, 1835; Nautical Magazine, 1846, p. 282.

† Mr. D. Rough, Auckland, March 7, 1844, and October 23, 1845.

which is placed upon a rock, over which there are 6 feet water.* Having passed which, the Port of Waitemata opens; the North head is rounded at about a quarter of a mile to avoid a sandy spit, which extends easterly.

A remarkable rock in form of, and called, the Bastion, is seen, from which extends a rocky ledge in a North direction, one mile; a *standing beacon* is placed upon the outer extreme, and a *black buoy* is in-shore of it; avoiding which there is a good working passage of 7 fathoms up to the town, in which depth, or from 5 to 10 fathoms, anchor, the church bearing South, the Bastion Rock, E. $\frac{1}{4}$ S., the holding-ground is very good. Moor with open hawse to S.W. The tide runs about 3 knots per hour. Wind from S.W. or N.E., with squalls and rain, prevails during the day, falling light or calm towards sunset, and coming on again most commonly about 10 A.M.; the Harbour of Waitemata is capable of containing 300 large vessels.

Above the harbour is an extensive piece of water, very shallow; near the middle of it is a rock called the *Boat Rock*, which at a little distance exactly resembles a boat; it is 15 feet long, and 4 feet above the surface at high water; this rock is usually covered with cormorants. Near the centre of the gorge, in the narrowest part, opening into this basin, are the remains of a small island about 30 feet high, having bushes on the top, called the *Sentinel*; it is composed of a sort of soft sandstone and clay; off which there is very good fishing with hook and line. It is about $2\frac{1}{2}$ miles from the head, the opening between which is about $1\frac{1}{2}$ miles. This is sheltered to the East by the southern part of the main land and the Island of Koreha; the Island of Waihekeh being eastward of it, some distance farther out.

The *North Head* is a round hill of moderate height, from the base of which rises another hill, round and high, Mount Victoria, upon which is the signal station; behind which, in the distance, is to be seen the summit of Rangi-toto. These two hills are upon a peninsula, which, like the greater part of this country where it is not forest land, is covered with fern. From these hills the land continues of a regular form, and of moderate height, for some distance round the North side of the harbour, bare of trees, and having a cliff of light brown sandstone, the strata horizontal and well defined. The *South Head* is lower than the North; it is a precipice, and is of the same formation as the rest. This harbour is broken into numerous bays, and the surface of the land undulates in moderate hills and slopes: in one of these bays, upon the South side, about half-way between the South Head and the Sentinel Rock, is the town of Auckland; it is called *Commercial Bay*, and is separated from Official Bay by *Britomart Point*, upon which are the barracks, and South of that the church is built, a brick building unfinished.

In *Official Bay* are the principal government officers' allotments, where they reside. Upon the ground above is the government house, a long low building of

* This red buoy was laid down in March, 1844. The rock may be easily avoided by keeping towards mid-channel, between the North Head and Rangi-toto; or, with a fair wind, passing about midway between the buoy and the North Head. The rock was accidentally overlooked in the survey made in H.M.S. *Britomart*. It is a volcanic patch, and has 2 fathoms, sand, about it, and 4 fathoms, mud, inside and outside of it.

wood upon a brick foundation. A stream of water rushes from this bay into the sea; the stream is small, but a convenient watering-place might be made there with little trouble. There is no landing-place, and shoal water extends to a considerable distance, so that a boat cannot come close up to the beach excepting at high water. A ship lately sailed out of the harbour laden with coals, which the inhabitants stood in need of, because there was no means of landing them in any moderate length of time. The various bays eastward are all occupied by different settlers; that next eastward of Official Bay is called *Mechanic Bay*; here is a rope-walk of some extent, the property of three brothers, who make cordage from the New Zealand hemp, that which is prepared by the natives being much the best; the demand is greater than their power to supply, and although we wanted rope there was none on hand for sale.

These bays have sandy beaches, the rocks projecting from the points which form them some distance into the water; flowering shrubs overhang the precipices of which they consist; the land between them rises with a gradual slope to the level ground, which forms the face of the country; it is here entirely covered with fern, upon which and the grass which grows under it the cattle thrive exceedingly. At the back of the town stands *Mount Eden*, the town itself standing in the county of Eden, the family name of the Earl of Auckland; this mountain, with others in its neighbourhood, is of volcanic origin, as is the island of Rangi-toto, and probably the whole country. These hills were formerly fortified places, and are nearly all encircled near the summit with a succession of trenches, many of great depth, giving the appearance of terraces, as many as five or six, one below the other. Mount Eden has a large deep crater in its centre, and is very remarkable as a native fortification. The hills rise abruptly from the plain, are steep, and of considerable height; are well formed for strong holds and places of defence in a country filled with warlike tribes. Masses and blocks of scoria of immense size cover the ground near these mountains, and are excellent for building. From the harbour there is no appearance of cultivated land, except a few small neat gardens in and near the town. The prospect is not, however, sterile, but has the appearance of down land.*

AUCKLAND is the capital of New Zealand, and, as will be seen from the preceding paragraphs, stands in the S.W. angle of the Hauraki Gulf. The harbour called the Waitemata extends to the westward of the site of the town, and was imperfectly examined by D'Urville. Since then, however, the face of things is changed, and all the means and appliances for the aid of shipping are at hand. The following account of the embryo city and its environs is chiefly drawn from that by Dr. Dieffenbach, so often alluded to previously.

The HARBOUR of WAITEMATA is the most important in the Gulf of Hauraki. It lies at the westernmost extremity of the gulf, and stretches its ramification towards the harbours of Manukao and Kaipara. The entrance into the harbour is distant from Coromandel Harbour 40 miles, from the embouchure of the Thames 45 miles, from Point Rodney 40 miles, and from Cape Colville

* Remarks by Sir E. Home, *Nautical Magazine*, November, 1846, pp. 566—568.

45 miles. The Waitemata is navigable for large ships for 8 miles from its entrance, and the holding-ground is excellent.

The latitude of the flagstaff in the military barracks at Auckland is $36^{\circ} 51' 27''$, its longitude $174^{\circ} 45' 20''$ E.

The northern head of the harbour forms a peninsula at high water. Two conical hills rise here, of which that forming the North Head, *Takapuna*, is 216 feet high, of an irregular form, and consists of hard basaltic rock; the other at a little distance from it, *Takarunga*, has on its summit a crater, partially broken in. It is 279 feet high, and consists of black and reddish vesicular lava. There is now a flagstaff erected on it. The navigable entrance into the harbour is only three-quarters of a mile broad, and it is narrowed by a reef, the outermost point of which is marked by a beacon, and is distant three-quarters of a mile from a curious bastion-shaped sandstone rock, which may be regarded as the southern head. Within the heads the channel widens to an average breadth of one mile; it has its greatest depth on the northern shore, and is shallow on the southern, on which the town of Auckland has been laid out, at the distance of $2\frac{1}{2}$ miles from the South Head.

The depth of the harbour is from 6 to 9 fathoms in mid-channel, and 3 and $3\frac{1}{2}$ at the sides. The inlet continues for about 10 miles to the westward, sending an arm to the northward towards the River Kaipara, and another to the southward towards the Harbour of Manukao. The northern one has a deep but very narrow channel near the northern shore; but shoals and rocks obstruct the passage leading towards Manukao, except for large boats, which can go up for several miles in the river-like inlet; and between its upper part and the harbour of Manukao, there is a portage of $1\frac{1}{2}$ miles.

The usual rise and fall of tides in Auckland are 10 feet; but they are influenced by the easterly winds, which sometimes raise them to 12 or even 13 feet; the time of high water at full and change is about $6^h 45'$.

The variation of the compass is 14° ; the dip, $61^{\circ} 7'$.

Auckland is well supplied with fresh water, not only by the small water runs in the valleys, but also by springs, from which it is readily obtained by digging a few feet below the surface.

Several volcanic cones rise in the immediate neighbourhood of the town, at the base of which hard scoræ for buildings and roads can be obtained. The sandstone forming the ground on which the town stands, though soft, hardens by exposure to the air, and is a good building material.

A mile to the eastward of Auckland there is a small bay called *Oraki*; it has a narrow entrance, and forms almost a natural dock, and could easily be converted into one by means of natural sluices. To this place the few natives who form the remnant of the once large tribe of the Nga-te-whatua, the proprietors of Waitemata, had returned from Manukao (in 1842); they cultivate the land, and by supplying firewood and provisions, and by working for wages, have made themselves very useful to the town.

Still farther to the eastward, another inlet, commonly called the *Tamaki*, leads towards Manukao; and here is the shortest portage into the latter harbour, it being only a quarter of a mile across. At the entrance into this channel is a bar

with 6 feet depth at low water, but inside the channel deepens; vessels of 200 tons have gone up for some distance, and large barges can go to the portage. The land on both sides of the Tamaki is excellent. A great deal of lignite is found on the Tamaki, but no wood, with the exception of jungle.

The town of Auckland, considering the short time it has existed, has made considerable progress. Its population, which, at the time of Dr. Dieffenbach's work (1842), amounted to more than 2,000, had been drawn together from all parts of the island. The thing that chiefly recommends the situation of this place for the central town of the Northern Island is its easy communication with the coast, both to the North and to the southward. An inland communication, through Kaipara, with the Bay of Islands, can be effected in five days, even with the present insufficient means. With the western coast, and with the interior, over Manukao and the River Waikato, nothing interrupts the water communication but two small portages; and even with Cook's Strait relations can be easily established, either by the River Thames, or the Waikato and Waipa, and the River Wanganui.

The coast trade, particularly, is of the greatest importance, as the nature of the country will cause its colonization at many different points at once. The Thames and the Piako form an extensive agricultural valley, and as their natural harbour, Waitemata is preferable to Coromandel Harbour.

In short, it appears to me that there can be no question but that the place has been very judiciously chosen for the site of a town, as commanding a great extent of cultivable land in its neighbourhood, great facility of communication with the coast, and the interior of the northern island; and as being a central point for the most powerful native tribes, the Nga-pui to the northward, the Waikato to the southward, and the Nga-te-hauwa to the eastward; separating them in a military point of view, but uniting them for the purposes of civilization and commerce.*

The TEHMAKI STRAIT was called the *Astrolabe Channel* by Capt. D'Urville, and is formed by the Islands of Wai Hekeh, Pahroa, Pakatoa, and others, with the main land.

WAI HEKEH is a pleasant island about 30 miles in circumference. It has a harbour for small vessels, and shelters the anchorage in the channel to the South. It consists chiefly of a yellow argillaceous rock and basalt; it is wooded and hilly, and contains kauri, particularly at its eastern end. There are some Europeans on it, and also some natives.

The passages towards Auckland on either side of Wai Hekeh are perfectly navigable. On the North side of the island is a rock above water, about a mile from the shore; and off the N.E. point of the island is *Bird Island*; to the S.S.W. of which, and about three-quarters of a mile from the shore, is another rock.

Off the West end of the island is that of *Hieh*, from the N.W. point of which a reef extends to the distance of a quarter of a mile.

Koreha, which is on the opposite side of the Tehmaki Channel to Hieh, is a

* Dr. Dieffenbach, *Travels in New Zealand*, vol. i. p. 280.

small island, in the conical peak of which is a well-defined crater, and which, with its scorix and pumice stone, indicates its volcanic origin.* It is now entirely covered with a thick and verdant herbage.

The *Wai Mogoia*, off the entrance of which the Island Koreha stands, runs to the South, and forms an isthmus only 2 miles broad, which separates the Tehmaki Channel from the head of the Bay of Manukau. This fact may, at some future period, become of considerable importance, as it would afford an easy means of connecting the navigation on either side of the island, and must add greatly to the advantage of the position of Auckland. The isthmus was examined by M. Lottin, under the orders of Dumont D'Urville.†

Off the South end of Wai Hekeh, on the main land, is the mouth of the *Wairoa River*; and to the east of this part the Tehmaki Strait becomes separated into two branches by a group of islands, of which the southernmost is *Pakii*; which, with the Kara Mouramou Rock, and some banks, obstruct this channel for ships. The only passage is that, therefore, which runs to the N.E. of Pahroa; and this is again narrowed by an islet, Takoupou, lying near its centre. D'Urville passed to the North of it, within 2 cables' length. Two miles to the N.E. of this is a bank of 10 feet, which again contracts the channel: it lies on the N.W. side. The continuation of the eastern boundary of this channel is by the *Ta-rotoroa* and *Pakatoa* Islands: off the latter, the northernmost, are an islet and some rocks. Where the Tehmaki Channel debouches into the Gulf of Shouraka, lies an isolated rock, entirely bare, desert, and inhabited by myriads of cormorants. The natives call it by the name of Ta-rekeh (*Tara-kai*), from *tara*, cormorant; and *kai*, to live. It is bold-to, and has no outlying dangers.

CAPE COLVILLE, or MOE HAO, is the North extremity of the peninsula which separates the Frith of the Thames from the ocean. It was named by Cook after the nobleman. He says it rises directly from the sea to a considerable height, and is remarkable for a lofty rock, which stands on the pitch of the point, and may be distinguished at a very great distance. It is said that there is a reef of rocks running off it. This is important.

Cape Colville, as before stated, is the extreme headland of a long promontory, forming the eastern limit of the Frith of the Thames; throughout its length runs a chain of wooded hills, with a sharp crest and steep declivitous sides, which are washed by the sea both on the eastern and western coasts; but on the latter the rocky line is interrupted by an inlet, which forms Waihao, or Coromandel Harbour; at the back of the harbour the hills rise into remarkable pinnaced and pyramidal summits.

WAIHAO, or COROMANDEL HARBOUR, is 25 miles from Cape Colville, and 35 miles from the mouth of the Thames. It is surrounded by hills, which, on the eastward, rise into a series of longitudinal ridges, to the height of about 1,500 feet. The shore is covered with verdure, and the soil on the lower hills is fertile. Coromandel Harbour is better adapted for small than for large vessels, as on account of the shallowness of the water, the latter cannot enter far enough to be effectually protected by the outer swell, although there is good holding ground.

* Cruise, p. 225.

† See Voyage de *L'Astrolabe*, vol. ii. pp. 274, et seq.

From Coromandel Harbour to the mouth of the Thames the coast is rocky, and there is no communication between the harbour and the valley of the Thames by land. Not far from the entrance to the Thames is a station of the Church Missionary Society, occupying a most picturesque position on the slope of the eastern mountains, which are crowned by a forest of lofty trees. An arm of the sea, which is joined by a creek, the *Wawakaurunga*, bathes the foot of the hills where the buildings are placed. A fertile alluvial flat spreads along its left shore, on which stands a large native fortification, *Kaneranga*, often containing nearly 2,000 inhabitants.

There is no harbour, properly speaking, in the Waihao, or Frith of the Thames, and large vessels cannot approach, as a mud-bank stretches out between the Thames and the *Piako*, a river entering the estuary to the West of it, having their embouchures close to each other: there is, however, a channel into the Thames with a minimum depth of $1\frac{1}{2}$ fathoms at dead low water; higher up the depth of the water is 3 to $3\frac{1}{2}$ fathoms. Small vessels have gone up the river nearly 50 miles, and large boats can ascend about 90 miles. A channel also leads into the *Piako*, but this river is the smaller of the two, and at low water admits boats only. Kauri timber is abundant on the hills South of Cape Colville.*

MOTOU TAKUPOU, or PASSAGE ISLET, is a conical rock off Cape Colville. It is stated that the island is badly placed on the chart; instead of being 3 or 4 miles from the cape, it is in reality 7 or 8. It is steep close-to.

The seaward face of the Gulf of Hauraki is protected by a range of large islands lying North and N.W. of Cape Colville. We have before alluded to those of Cape Tewara, the N.W. point, as being named the Hen and Chickens by Cook.

OTEA, or the GREAT BARRIER ISLAND of Cook, is the southernmost of them. It is hilly, and very much intersected in its conformation. It is about 20 miles in length North and South, and 8 in its greatest breadth. Some islets are scattered along its western side. Its North point was called *Aiguilles* (Needles) Point by D'Urville. From the West the North point of Otea appears terminated by a peninsula, bare of verdure, of a brownish colour, the sea-beaten flanks of which had an imposing appearance. Besides this, it is accompanied by some peaked rocks, which assume the most fantastic forms, and some of which are very much broken. From this circumstance he applied the name to the cape. The work of Cook was found to be very incorrect here.

Off Cape Aiguilles is *Arid Island*, small, and not more than 4 or 5 miles in circumference, lying to the N.E. of Otea Island. The South point of Otea was called *Barrier Cape*, and is 10 miles N.E. of Cape Colville. It is not clear, as represented on the chart, but there are rocks above water at least a mile from it.

Its western side, which is very imperfectly represented in D'Urville's chart, has several ports, with the names of which we are only acquainted. These are, proceeding from South to North, *Ports Tofiño*, *Wangeparapara*, *FitzRoy*, *Abercrombie*, and *Catharine*.

This last probably is that described by Mr. Rough as being 6 miles to the North

* Dr. Dieffenbach.

of Cape Krusenstern, and is a good harbour; a very remarkable rocky column stands on the South side of its entrance, from which the North end of Shoutourou bears about W. by S. $\frac{1}{2}$ S.

The first cove on the left, about a mile from the entrance, called *Nagle Cove*, affords excellent shelter for a few vessels, and farther up is an extensive anchorage, but it is not safe to anchor in the harbour with the entrance open. A copper mine is (or was) worked, and a large vessel was being built in Nagle Cove, where good fuel and water can be obtained in abundance.*

The *Pirogues*, a small group of bare and isolated rocks, which at a distance have the appearance of canoes under sail, were named by D'Urville. They lie 2 or 3 miles to the South of the West cape of Otea, named *Cape Krusenstern*.

SHOUTOUROU, also called the *Little Barrier*, a large island midway between Otea and Point Rodney, rises rapidly on all sides to a cone of very considerable height, so as to be easily seen from all parts of the gulf. A very violent surf prevents the easy access to it by small boats.

A dangerous sunken rock, called the *Horn Rock*, lies about $3\frac{1}{2}$ miles from the South point of Shoutourou, and W.S.W. of Cape Krusenstern.

Between Aiguilles Point and Cape Tewara are two small groups, named on D'Urville's chart the *Fanal Isles* and the *Moko-hinou Isles*. To the S.W. of the former is the *Navire*, or *Ship Rock*. In a line between Shoutourou and the largest of the Fanal Isles, about 6 miles to the southward of the latter island, there is a rock above water, called the *Simpson Rock*.

We will close this description of the Hauraki Gulf with the following brief observations by Mr. David Rough, the harbour-master, in 1845:—

S.W. winds prevail on this coast; about the times of the moon's full and change, easterly gales, accompanied with rain, may generally be looked for; they continue two or three days, veer to the N.W., and sometimes blow with great violence, gradually subsiding as the wind gets round to the S.W. The barometer rises at the approach of easterly winds, and its fall indicates a change of wind.

With westerly winds it is advisable to keep close to the shore, especially towards the evening, when a land-wind may be expected.

The *flood tide* sets to the southward in the gulf, and the ebb to the northward, about $1\frac{1}{2}$ miles per hour.

At Auckland good water may be procured; firewood, spars, provisions, and other supplies, may be obtained at very reasonable prices.

The want of good landing-places is still felt at Auckland, though much has been done to remedy the evil during the last year.

A *pilot* for the harbour may be obtained outside the North head.

CAPE COLVILLE, before mentioned, is in lat. $36^{\circ} 28' S.$, lon. $175^{\circ} 20' E.$ At 3 miles to the East of it two islands are marked on the charts, and about half way between a reef, partly above water, runs about a mile in a W.N.W. direction, from a point projecting from the main land.

At 5 or 6 miles S.S.E. of Cape Colville there is an inlet called, on Cook's chart, *Port Charles*, and at 12 miles S.S.E. of Port Charles is another larger one,

* Nautical Magazine, June, 1846, pp. 281-2.

which perhaps is the *Port Trial* where the ships *Trial* and *Brothers* were attacked by the natives, in 1816.—(Missionary Register, 1817.)

Cuvier Island of D'Urville is $3\frac{1}{2}$ leagues S.E. from Barrier Cape. It is bold-to, and will serve well to point out the entrance to Hauraki Bay. Its lat. is $36^{\circ} 26' S.$, lon. $175^{\circ} 42' E.$

The HAUSSEZ ISLANDS seem to be very imperfectly shown upon all the charts hitherto published, as indeed may be said of all the coast hereabout. Capt. Hayes, of H.M.S. *Driver*, observed the sea breaking on a *rock* about 2 miles N.E. of the northernmost of them, which was not laid down on the chart.

MERCURY BAY, or WITI ANGA, was visited and named by Cook. He gave its appellation on account of the observations made there of the transit of Mercury over the sun, November 9th, 1769. There are several islands lying both to the southward and the northward of it, and a small island or rock in the middle of the entrance. Within this island the depth of water nowhere exceeds 9 fathoms; the best anchorage is in a sandy bay which lies just without the South head, in 5 and 4 fathoms, bringing a high rock or tower, which lies without the head, in one with the head, or just shut in behind it. This place is very convenient for wooding and watering, and in the river there is an immense quantity of oysters and other shell-fish. For this reason it was named *Oyster River*. But for a ship that wants to stay here any time, the best and safest place is in the river at the head of the bay, which, from the number of mangrove trees in it, was called Mangrove River. To sail into this river the South shore must be kept on *all the way board*. The North head of this bay, *Point Mercury*, is a very conspicuous promontory. The island in the middle of the entrance is in lat. $36^{\circ} 46' S.$, lon. $175^{\circ} 43' E.$

The BAY of PLENTY, a very comprehensive name, extends from Cape Colville to Cape Runaway. It was called the Bay of Plenty by Cook, in March, 1770, because of the numerous population on the coast, which he believed to acknowledge but one chief, Teratu. But these people, as has been before mentioned, have been scattered and destroyed by the bloody wars carried on by E Onghi and his fierce followers.

The coast to the southward of Mercury Bay is as yet not very well known. Cook sailed past it, and so did D'Urville. In the time of the first of these navigators the coast was well inhabited, but he did not land.

The ALDERMEN, or COURT of ALDERMEN as named by Cook, lie to the S.E. of Mercury Bay. He says they lie in the compass of about half a league every way, and 5 leagues from the main, between which and them lie other islands, most of them barren rocks, of which there is great variety; some of them are as small in compass as the monument of London, but rise to a much greater height, and some of them are inhabited. They lie in lat. $36^{\circ} 57'$, and at noon bore S. $60^{\circ} E.$, distant 3 or 4 leagues; and a rock, like a *castle*, lying not far from the main, bore N. $40^{\circ} W.$ at the distance of one league. D'Urville describes them as a confused collection of ten or twelve barren and naked rocks, two or three of which scarcely merit the name of islets. When they bore South, about 18 miles off, the easternmost showed in the singular form of a very sharp-pointed and detached needle rock.

The coast of the main island here, at the distance of 7 or 8 leagues, appears like a high chain of tolerably regular hills, the conformity of which is only broken by a few peaks rather more pointed.*

TOUHOUA, or the MAYOR, is the next island of consequence to the southward. It was thus named by Cook. According to the accounts collected by Dr. Dieffenbach, it consists of very rugged basaltic rocks and obsidian *in situ*, with narrow but fertile valleys. It is inhabited by a tribe of about 200 natives, who cultivate the land, and occasionally provide passing whalers with provisions.†

The ASTROLABE REEF very nearly proved fatal to D'Urville's ship. Its position was gained approximatively, and it is 5 miles to the South of the eastern side of Touhoua or the Mayor. It consists of a reef of sharp-pointed rocks, which are scarcely beneath the surface, and extending to a very considerable distance.

TAURANGA HARBOUR lies 7 leagues to the southward of the Mayor. It is a missionary station, and has only been visited by small vessels of about 200 tons. Although over the bar there are 4 fathoms water, the channel is very narrow, not being more than 100 yards in breadth; and from its bending at a sharp angle, large craft would ~~have~~ great difficulty in entering it. Its southern headland is formed by a solitary conical hill, *Maunga-nui*, of about 1,500 feet in height, and connected by low land to the main. There are many traces of a former and very extensive native village on its sides. The northern head of Tauranga spreads out into low and level land: and some islands of considerable dimensions, and of the same structure and configuration as the main land, are separated from it by broad channels of the sea. Although at present the anchorage for vessels is in the inner harbour, not far from the mission station, it is probable that the islands just mentioned might offer safe places for anchoring, even for larger vessels.

The remarkable phenomenon of these large portions of land being separated from the main, shows that great changes have taken place in the geological condition of this coast. The coast at Tauranga and on those islands is from 40 to 80 feet above the sea level, and on the cliffs thus formed are beds of peat, containing a great quantity of undecayed wood, and averaging between 4 and 6 feet in breadth. This lignite (or imperfect coal) occurring in such large quantities, must be of great importance to Tauranga, as there is no other fuel for several miles around. One of these islands is called *Pane-pane*, and stretches from Maunga-nui to the South about 3 miles broad and 7 long. Another, running in the same direction, but nearer the coast, and of the same size, is called *Matakanga*. A larger one, in the same line, is called *Moa Opareoroi*. The one nearest the coast, and of a square shape, is called *Tangoia*. Off the entrance of Tauranga is a small island, 3 miles from the southern headland, and a mere rock of basaltic lava. It possesses some interest as being the only spot known where a new species of reptiles (*Hatteria punctata*) are known to exist.

Tauranga was in former times an important place for the pig and flax trade; and several European traders have lived here for many years. But the flax trade

* Cook's First Voyage, vol. i. chap. 3; D'Urville, vol. ii. p. 141.

† Dr. Dieffenbach, vol. i. p. 406.

has declined, but that in pigs is still carried on. The natives, about 3,000 in number, are converted to Christianity, one-half belonging to the Church of England, the other half to the Romanists, and the mutual opposition is entered into by the converts.*

HIGH ISLAND of Cook lies off the coast to the N.E. of Tauranga, and Flat Island of the same would lie about 25 miles S.E. $\frac{1}{4}$ E. of it. He says it is not more than 4 miles from the coast; but the examination of this coast, as recorded both by Cook and D'Urville, is so vague, that nothing very definite can be gathered from either.

LOWLAND BAY of Cook is to the southward of High Island. A river runs into it, at the mouth of which is the village of *Maketu*. Off this is the Island of *Motu-iti*, of considerable extent, and said to have been purchased by the Americans.†

Proceeding to the eastward, at 20 miles W.N.W. from Mount Edgecumbe, we arrive at a steep cliff, which extends for 9 miles; it is wild and inhabited. It then suddenly gives place to a very level and low tract of land, bordered by a fine sandy beach. Cook here observed numerous villages, well fortified, and surrounded by palisades.

MOUNT EDGECUMBE, a "high round mountain" (Cook), lies 3 miles from the coast. D'Urville says it is of moderate height, but its isolation in the centre of an immense plain renders it very remarkable. It is in lat. $38^{\circ} 0'$, lon. $177^{\circ} 2'$. To the N.N.E. of this mountain, and 10 miles from it, is the Island *Motou-Hora* (Mowtohora of Cook), which is only 3 miles in circumference, but surmounted by a very high peak. On the South side is anchorage in 14 fathoms water. At 5 miles W. by N. from this island is a group of very dangerous rocks, awash; but between these rocks and Motou-Hora on one side, and the coast on the other, the passage is safe and clear in 9 to 14 fathoms water, and 5 miles broad.‡

PUHIA-I-WAKADI, or WHITE ISLAND, is 10 miles N. by E. of Motou-Hora; lat. $37^{\circ} 33'$, lon. $177^{\circ} 14'$ E. It is a low island, still in volcanic activity, and produces a great quantity of sulphur. This sulphur is very pure, producing 90 per cent., and several cargoes have been brought to Europe, where it has been sold for £8 per ton. The island is claimed by an Englishman, one of the oldest settlers in the country, who lives on the opposite coast, in *Wakatane*, or *Highland Bay*. It emits volumes of smoke and suffocating vapours, and has been visited by Mr. Williams and Mr. Cunningham, of the Bay of Islands.

The *Pelorus Rocks*, it is stated, lie to the S.E. of White Island. We have no details of the coast between Motou-Hora and Cape Runaway. D'Urville remarks, that for about the space of 20 miles the coast is very low near the sea, with three or four ranges of hills which rise one above the other into the interior,§ then, after it begins to trend to the N.E., it becomes more rugged. At the time when Cook passed here it must have been very thickly populated, for he saw in one day forty-five canoes full of natives, who approached his ship at one time, November 1, 1769.

* Dieffenbach, vol. i. pp. 403—407; see also *Révue Britannique*, No. 59, 1830, Paris.

† Dieffenbach, vol. i. p. 405.

‡ D'Urville, vol. ii. pp. 127-8

§ *Ibid.*

CAPE RUNAWAY (or *Te Kahu*) was named thus by Cook, from the flight of the natives, who commenced hostilities with him, October 31, 1769. It is a rounded hill, forming a peninsula almost entirely separated from the land, and terminating to the northward by a very detached point. From this cape the land trends directly to the S.W., forming the East limit of Cook's Bay of Plenty. To the East of it the coast is high and steep; at 7 miles' distance, it presents a tolerably deep cove, *Lottin Bay*. Seven miles still farther to the East is *Cape Wanga Parawa*, a well-marked point, projecting to the East. Immediately after this the coast runs South for the space of 6 miles, and forms a deep bay, which bears the name of *Wai Tepori*, in the neighbourhood of which Cook observed a great population, a large number of villages, and much cultivated land; the country in general appeared more fertile than to the southward; it was low near the sea, but hilly within. Cook passed a bay 4 leagues West of East Cape, which he calls Hicks's Bay, after his lieutenant.

EAST CAPE, or WAI APOU, lies 8 miles from Wai Tepori Bay. The cape itself is a hill, in the form of a truncated cone, of from 300 to 360 feet high, which is joined to the land by a narrow and very low neck, so that it appears as an island at a short distance. To the right and left of it the land is covered with trees. Off the cape, at the distance of a mile, is *East Island* (of Cook), the real name of which is *Houana Hokeno*. It is only a rounded mass of small extent, steep on all sides, and appears to be united to the cape by a line of breakers, partly submerged, so that the passage between them does not appear practicable.

East Cape is in lat. $37^{\circ} 42' S.$, lon. $178^{\circ} 39' E.$ * (D'Urville.) Beyond East Cape the coast runs to the S.S.W., forming coves and sandy beaches at intervals. The land near the shore is moderately high, but inland it is overtopped by high mountains, among which *Mount Ikou Rangui* rises præminent. This giant of mountains stands amid the secondary groups which here form the central ridge of the great island. Its pointed summit was seen by D'Urville at more than 70 miles' distance, and is thus an excellent mark for this part of the coast. Notwithstanding its elevation, which is prodigious, it had no appearance of snow on it in February, 1827.

Toko Malu, or *Tegadoo Bay* of Cook, where he anchored, is only a cove, but very little sheltered from the winds and swell from seaward. The South point of it terminates in a very projecting peninsula. Cook found it exceedingly difficult to get water, on account of the surf.

HAUA-HAUA, or TOLAGA BAY, is 12 miles to the southward of Toko Malu. "It is moderately large, and has from 7 to 13 fathoms, with a clean sandy bottom and good anchorage, and is sheltered from all winds except the N.E. It lies in lat. $38^{\circ} 22' S.$, and $4\frac{1}{2}$ leagues to the North of Gable End Foreland. On the South point lies a small but high island, so near the main as not to be distinguished from it. Close to the North end of the island, at the entrance into the bay, are two high rocks; one is round, like a corn stack, but the other is long, and perforated in several places, so that the openings appear like the arches of a bridge. Within these rocks is the cove where we cut wood and filled our water casks. Off the

* D'Urville, vol. ii. p. 117; Cook, chap. 3.

North point of the bay is a pretty high rocky island, and about a mile without it are some rocks and breakers. The variation of the compass here is $14^{\circ} 31'$ E., and the tide flows at the full and change of the moon about six o'clock, rise and fall about 6 feet; but whether the flood came from North or South was not determined.* D'Urville adds that the surrounding country is picturesque and well peopled. Hogs were so abundant on this part of the coast, in 1827, that they might be procured at discretion for knives or a little powder. Near the South point are two rocks pierced in arches by the waves.†

CAPE GABLE, or, as it was named by Cook, *Gable End Foreland*, “from the very great likeness of the white cliff at the point to the gable end of a house; it is not more remarkable for its figure than for a rock which rises like a spire at a little distance.”‡ Its native name is *Pari-nue-te-ra*.

TAONE ROA, TURANGA, or POVERTY BAY, is thus described by Cook :—“The next morning, at six o'clock, we weighed, and stood away from this unfortunate and inhospitable place, to which I gave the name of *Poverty Bay*,§ and which, by the natives, is called, *Ta One Roa*, or the Long Sand, as it did not afford us a single article that we wanted but a little wood. It lies in lat. $38^{\circ} 42'$ S., lon. $181^{\circ} 36'$ W. It is in the form of a horse-shoe, and is known by an island close under the N.E. point. The two points which form the entrance are high, with steep white cliffs, and lie $1\frac{1}{2}$ or 2 leagues from each other, N.E. by E. and S.W. by W.; the depth of water in the bay is from 12 to 5 fathoms, with a sandy bottom and good anchorages, but the situation is open to the wind from South to East. Boats can go in and out of the river at any time of the tide in fine weather; but, as there is a bar at the entrance, no boat can go in or out when the sea runs high; the best place to attempt it is on the N.E. side, and it is there practicable when it is not so in any other part. The shore of the bay, a little within its entrance, is a low flat sand; behind which, at a small distance, the face of the country is finely diversified by hills and valleys, all clothed with wood, and covered with verdure. The country appears to be well inhabited, especially in the valleys leading up from the bay, where we daily saw smoke rising in clouds one behind another to a great distance, till the view terminated in mountains of a stupendous height.

“The south-west point of the bay I named *Young Nick's Head*, after the boy, Nicholas Young, who first saw the land.” This was the first landfall of Cook in New Zealand; he then thought he had come on the *terra australis incognita*.

Off the entrance of Turanga Bay a sunken rock is said to exist.

THE TERA-KAKO PENINSULA lies 18 miles S.S.W. of Turanga Bay. The coast between is steep and covered with wood. The peninsula is 15 miles in length, North and South, with a mean breadth of 5 miles East and West.

TABLE CAPE is its N.E. point, and was so named by Cook from its figure, being of moderate height, but very flat on the top. The peninsula is connected

* Cook, chap. 2.

† D'Urville, vol. ii. pp. 93, 376.

‡ Cook, chap. 2.

§ Cook, on his approach to the bay, was attacked by the natives, one of whom was shot in self-defence. The particulars of this occurrence, from the native accounts, are given by Mr. Polack, in *Travels, Adventures, &c.*, 1831—1837. He says that the real name of the place is *Turunga*, any sandy spot having the term *Oné* or *Oni* attached to it. Its real fertility merits any other name than *Poverty*.

with the main by a very low tongue of land, which the officers of the *Astrolabe* were disposed to think was intersected by a narrow channel ; this fact, which remains to be proved, would make Tera-Kako into an island, the main land having just the same level aspect, the part in question being but a space of low land, which appears to separate Hawke's Bay from the sea to the N.E.

Cook steered along the eastern side of the peninsula : " At the distance of 2 or 3 miles the soundings were from 20 to 30 fathoms, having a chain of rocks between us and the shore, which appeared at different heights above water."

TEA HOURS, or ISLE of PORTLAND, lies off the South point of Tera-Kako. It is a round island of moderate elevation, and steep on all sides. Its summit is a plain, with a few bushes and grass on it ; a few palisades showed that it was sometimes visited by the natives. It is only separated from Tera-Kako by a narrow passage, which seemed to be entirely closed by rocks even with the water's edge. It was called the Isle of Portland by Cook, " from its very great resemblance to Portland, in the English Channel." N. 57° E. 2 miles from the South point of Tea Hours, lies a sunken rock, upon which the sea breaks with great violence. The passage between has from 17 to 20 fathoms. Cook says the native name of the island is *Tea Howray*.

HAWKE'S BAY, named by Cook after Sir Edward Hawke, the first Lord of the Admiralty, is bounded on the N.E. by Tera-Kako, and to the S.W. by Kidnapper's Point. This extensive inlet, not less than 40 miles wide, is but very imperfectly known. Cook's account is very vague, and can be of no service. A large river, the Wairoa, falls into it in the head of the bay. The land in the N.E. part is moderately high ; it seems to become lower to the West and to the S.W., where it presents numerous pleasant prospects, and has a fertile aspect.

Ahuriri Harbour lies in its S.W. part. It was seen, but passed, by Cook, and also by the *Astrolabe*.

CAPE MATA-MAWI, or KIDNAPPER'S POINT, is in lat. 39° 41' S., lon. 177° 9' E., and is " very remarkable by two white rocks, like haystacks, and the high white cliffs on each side. Its second name was applied from the circumstance of the natives trying to carry away the son of Tupia, a little boy on board Cook's ship. This led to some loss of life among these ferocious people. D'Urville says that it is high, bare, and perpendicular, in the form of a wedge lying on its side ; two pointed rocks, and similarly bare, are close to it, and breakers extend off it on the North side to the distance of a mile." *

For the space of 11 miles to the S.S.W. of this cape, the coast, partly formed of sandy beaches, presents an agreeable aspect. In lat. 39° 51' S. lies *Motu Okura*, or *Bare Islet*, crowned by a *pa*, the ramparts of which are constructed on the slope of a hill ; behind this islet the coast forms a creek, where a vessel could probably anchor ; for a point, which projects considerably, defends it from winds from S.W. and South.

Beyond this part the coast continues to trend tolerably uniform to the S.S.W., without anything remarkable ; only, from lat. 40° 10' to 40° 20' S., it forms a slight and very obtuse projection, which would answer to the *Black Head* of Cook.

* D'Urville, vol. II. p. 89.

Cape TOPOLO-POLO or TURNAGAIN is in lat. $40^{\circ} 32' S.$, lon. $176^{\circ} 43'$. It consists of a rather low point, crowned by a conical peak of evident volcanic origin. A small bay, entirely open to winds from the S.E., lies on its S.E. side. The vertical furrows on the cape, broad whitish bands, and its serrated summit, indicate the volcanic nature of the cape. Besides this, a white patch, a short distance to the South, makes it easy to be known. It is also the only point which is a well-marked projection between it and Cook Strait. Cook here turned to the northward, October 17th, 1769; hence its name.

From Cape Topolo-Polo the direction of the coast becomes S.W. to S. for nearly 45 miles, always of moderate height; it is surmounted by high mountains in the interior. Sometimes the coast is low, and presents very pleasant localities.

CASTLE POINT of Cook, in lat. $40^{\circ} 57' S.$, lon. $126^{\circ} 20' E.$, is a rock projecting into the sea, nearly detached from the coast, and at a distance bearing some resemblance to a fortress. A black islet, flat and long, lies on the coast, a mile to the North of Castle Point.

Thirteen miles farther, and in lat. $41^{\circ} 9' S.$, lon. $176^{\circ} 11'$, is *Point Tehouka-Kore*, formed by low land, covered with wood, and inhabited. On Cook's chart it is called *Flat Point*.

From this point to Cape Kawa-Kawa, an extent of more than 50 miles, the coast runs to the S.W. and W.S.W. without presenting anything particular to the navigator. The mountains increase in height as Cape Kawa-Kawa is approached, and the shore itself is but a narrow belt of low land, while here and there a few smokes may be distinguished. Throughout this extent the sea breaks with great fury upon the uniform beach.

Cape KAWA-KAWA or PALLISER forms the southern extremity of the North Island. It is composed of high mountains, very irregular, and terminating to the South in an obtuse point. This point is accompanied by a narrow beach of low land, with some pointed rocks scarcely 2 cables' length from the shore. Immediately to the West of the cape, which is in lat. $41^{\circ} 37' S.$, the coast runs up directly to the North for 16 miles, forming one side of Palliser or Useless Bay.

PALLISER or USELESS BAY, an extensive open bight, lies at the South extremity of the North Island of New Zealand. The distance between the extreme points, Capes Palliser and Toura Kira, forming the bay, is about 25 miles, and the depth of the bay about 13 miles. It lies entirely exposed to the full force of the S.E. winds; and, as the bottom is sandy, there is no holding ground for vessels, which renders it very dangerous. But this exposure is said to be obviated in some degree by a small harbour, *E-kopi*, on the S.E. side, formed by a projecting point of land, where there is excellent anchorage, and where a ship of 400 or 500 tons might remain in safety even in a strong north-easter.

The *valley of the Wairarapa*, which runs from the head of Palliser Bay, has a N.E. and S.W. direction, averaging rather more than 9 miles in width. At the southern end of the valley are two lakes, covering an area of 50,000 acres, but they are so shallow as to be comparatively useless; there is no entrance seaward, in consequence of a complete bar of sand, and they are surrounded by a tract of low swampy land. The bar, which is formed by southerly winds, to the full force of which Palliser Bay lies entirely exposed, closes the lake during the summer

months (generally from December to May), until the accumulated waters burst the barriers that confine them, and open a passage to the sea. The *River Ruamahanga* runs through the whole valley, and loses itself in the lakes; it is from 6 to 9 chains wide; the channel of the river, until it leaves the lake, is deep enough for a vessel of 50 tons, and whale boats can ascend the river for 20 or 30 miles above the lake; after which it becomes a succession of shoals and falls.*

PORT NICHOLSON.—This is the situation of the first settlement, Wellington, made by the New Zealand Company in 1840. It is a noble expanse of water, and at its head the River Hutt debouches through a series of marshes. When once the harbour is entered, the ship is perfectly secure, and this security gives a favourable impression to the first intimacy with New Zealand. The harbour is surrounded by high hills, terminating abruptly at the water, and covered with trees and vegetation. Without regarding the valley of the Hutt, the abrupt termination of the land on the shore would, at first sight, strike the stranger with its unsuitableness for the site of a large town, the future capital of New Zealand, as it was intended to be. Thus the town, as at present constituted, has a very great extent of water frontage in Lambton Harbour, but has few capabilities of extension inland, without excavating the face of the cliffs.

There has been some difficulty experienced by strangers in finding the entrance to Port Nicholson; but the beacon lately erected on its eastern head will, in some measure, obviate this; but it may be here observed, that this, it has been stated, cannot be seen at more than 5 miles off.

The following description and directions are extracted from the Southern Province Almanac, Wellington, 1849:—

On approaching the port from seaward, *Cape Palliser*, as the most prominent point, will be observed: it is a high and bold promontory, and may be neared with a degree of considerable safety. As seen from the eastward or westward, at a distance of 15 miles, it rises from the sea in a gradual and regular ascent to the high mountains at the back, which are of irregular outline, and peaked. From this promontory to Cape Turakirai (*Taoukira*) the course is W.N.W. 20 miles. The outline of the land at the back of Turakirai is more regular than that of Cape Palliser, and appears to end in a bold and abrupt convexity. On a nearer view, however, a low point will be observed, extending from the base into the sea, giving it much the appearance of the snout of a porpoise. As seen more from the southward, the hills at the back are gradually lower into the flat land of Palliser Bay.

The course from Turakirai to Baring's Head is N.W. by W. 3 miles. *Baring's Head* is the extremity of a table flat, extending in a north-westerly direction to within a mile of Pencarrow Head;† the indentation of the coast between Baring's Head and Pencarrow Head forms *FitzRoy Bay*, where small vessels sometimes ride out north-westerly gales, bringing the high rocks off Pencarrow Head, and

* Cook's Strait Almanac, 1846.

† On rounding Cape Palliser from the eastward, the land will be seen to terminate in a long table flat, similar to that before mentioned as forming Baring Head.

those a quarter of a mile to the southward of them, to cover the entrance of the harbour.

Pencarrow Head is a bold cliff, on the summit of which is a white beacon, about 30 feet in height, a good mark for the entrance of the harbour, but it may not be seen until within 5 miles, unless the weather be very clear.

The land on the western side of the entrance is moderately high to seaward, but ascends considerably towards the harbour. At a distance of 10 miles, it appears to be separated from the land farther to the westward; but is in reality connected with it by a low narrow isthmus, which divides Evans's Bay on the harbour side from Lyall's Bay. This has often been mistaken by strangers for the entrance to the harbour.

On the western side of the entrance, bearing E. by N. $\frac{1}{4}$ N. from *Pencarrow Head*, is *Palmer's Head*, from which a rocky reef projects to the distance of half a mile. The rocks are all visible, and may be safely approached within a quarter of a mile; on the hills between *Palmer's Head* and *Point Dorset* a beacon is erected. About a mile West of *Palmer's Head* is *Lyall's Bay*; on the fern hills, West of this bay, on the summit of *Mount Albert*, is the signal station.*

From the low neck between Evans's and Lyall's Bays, to the distance of 2 miles along the coast, the ascent is gradually hilly; the land rises considerably for 2 miles farther to *Sinclair's Head*, where it is a bold cliff. Four miles to the north-westward the land continues high till it descends into the *Oterango valley*, after which it rises in an almost semi-circular hill, called by the natives *Omere* (on the chart *Terawiti*). The remarkable convex appearance of this hill renders it easily distinguishable from *Turakirai*, or *Cape Palliser*, when seen from a northerly or southerly direction.

Between this cape and *Sinclair Head* a reef extends about the distance of $1\frac{1}{2}$ miles from the shore, terminating in a high rock, called the "*Seal Rock*."

Captain Unthank, of the brig *Bee*, discovered a dangerous *sunken rock*, the bearings of which are as follow:—

Sunken Rock bears S.E. by S. by compass from the *Seal Rock*, about three-quarters of a mile, and taking the *Seal Rock* and the reef off *Sinclair Head* upon a parallel, it will be found about half a mile South of that line, and from 2 to $2\frac{1}{2}$ miles from the main land. The rock is visible about 3 inches below water, at neap tide only, and is apparently a perfect steeple. The rock, called by Capt. Unthank the *Seal Rock*, is described in one chart of *Cook's Strait* as the "*Karori Rock*."

* There is a signal staff on *Mount Albert*, on which the following signals are made:—

A Square denotes a Ship

A Cross " Bark

A Circle " Brig

A Triangle denotes a Schooner

A Diamond " Cutter

A Parallelogram Steamer

A white flag at the mast-head denotes a sail in sight; when the class is ascertained, the descriptive signal will be hoisted at the yard-arm.

English vessel of war, Union Jack at mast-head.

Foreign vessel of war, Union Jack with white pendant.

Government brig, white pendant under descriptive signal.

When the vessel is inside the Heads, the flag will be lowered.

When a vessel is at anchor, either inside or outside the Heads, the flag is lowered to half-mast.

A vessel in distress, or on shore, descriptive signal half-mast.

Fore-and-aft schooner, a triangle, hollow in the centre.

DIRECTIONS.—Running for Port Nicholson, with a north-westerly wind from the northward, Cape Terawiti should be rounded close, say within 3 miles, as the only dangers are the *Seal Rock*, which, as before stated, lies about $1\frac{1}{2}$ miles from the shore, between Sinclair Head and Cape Terawiti, high out of the water, and safe to approach within half a mile; and the *Sunken Rock*, off the Karori stream (near Terawiti), before described. The course from Terawiti to Sinclair Head is E.S.E. 6 miles; then the course is E.N.E. 6 miles, to the outer rock of Barrett Reef. If the wind be moderate, and the weather clear, a vessel that is easily managed may work in night or day, all the rocks being uncovered, except a few in a line with a reef. She may, if necessary, lie inside the rock till daylight, being ready to weigh anchor immediately on a shift from the southward. Should the N.W. wind be too strong to work into the harbour, the entrance should be kept open; and, in thick weather, a sufficient offing preserved, in case of a southerly shift of wind—this, of course, will depend on circumstances; for, with a moderate north-wester, if it be not deemed advisable to enter at night, should the wind be steady, and the weather clear, a sudden change of wind seldom occurs; and, as there is no hidden danger, a vessel may be kept under sail, with the entrance open, till daylight, or, in case of a shift, she may run in with all safety.

It is hardly necessary to give any directions for approach from the eastward; care should be taken to avoid being embayed between Capes Palliser and Turakirai; and if the land be not distinctly visible, the harbour should not be attempted at night. As a matter of precaution against danger, the vessel should be kept under snug sail, if the weather be at all unsettled.

The outer rock of Barrett's Reef may be rounded at the distance of 200 yards, with Waddell's Point bearing N. by W.

The stream of flood runs to the northward until eight o'clock, or four hours later; the ebb sets to the southward; between Sinclair Head and the entrance to the harbour there is little or no tide felt; and generally with the flood tide there is an eddy found setting to the eastward towards the entrance.

The soundings are regular in the narrows, 10 and 11 fathoms close to the rocks, and 8 fathoms 1 cable off the East shore; the deepest water is near Barrett Reef, both in the eastern channel and Chaffer's Passage, which is between Palmer's Head and the reef.

There is a small reef, about half a cable, running off the Pinnacle Rock, which is connected to Point Waddell by a reef, and should not be approached too close. After passing the Pinnacle Rock, the shores are bold on each side; the small rocks lying off the points showing the deepest water are on the West shore; between Ward's Island and the main is a narrow channel of 3 fathoms, for small vessels. After passing Ward's Island the soundings are regular, 10, 11, and 12 fathoms. Somes' Island is steep close-to, on each side.

The *Bally Rock* is said to lie off Point Jerningham about 100 yards, with 6 feet on it at high water.

Lambton Harbour, on the shores of which the town of Wellington is situated, runs up S.W. by W. $4\frac{1}{2}$ miles from Somes' Island; the shores on both sides are bold up to the Bellsizes Point, off which runs a small sand-spit, about one cable

distant; from this point to the head of the harbour, there are from 10 to 3 fathoms, muddy bottom.

Evans's Bay runs in South $2\frac{1}{2}$ miles from off Point Halswell; the shores are bold on each side of the bay, with 10 and 11 fathoms in the middle.

In addition to these, the official directions, the following will be useful:—

The land running down to Baring Head is level, terminating in a perpendicular cliff, with a small reef out of water, running off it.

There are several small reefs above water, running a short distance from the beach, round FitzRoy Bay. Sinclair Head is the termination of a ridge of hills, which ends in a steep bluff, off which lies a long reef of black rocks, mostly out of water, with sharp peaks about 20 feet high, and may be seen several miles off. From this reef to Barrett Reef, off Point Dorset, are several reefs of black peaked rocks, running off the coast; by passing them at the distance of a mile all dangers will be cleared. Off Pencarrow Head lies a reef about one cable distance, out of water. Barrett Reef, which is mostly out of water, lies nearly midway between the entrance heads; it is bold close-to, 10 fathoms a boat's length off the reef. *Chaffer's Passage* is between Palmer Head and Barrett Reef. The passage is clear of rocks, with deep water, but not so broad as the Eastern Channel, which is the best for a person not acquainted with the port, and the set of the tide is more regular. Spring tides run in the narrows about 2 knots. There are several small reefs stretching off the East shore, in the entrance, mostly out of water; by keeping about one cable distant off the points, the wash rocks lying off them will be cleared. The soundings are regular in the narrows, 10 and 11 fathoms close to the rocks, and 8 fathoms 1 cable off the East shore; the deepest water is near the reefs in both channels. There is a small reef, about half a cable, running off the *Pinnacle* or *Steeple Rock*, which is connected to Point Waddell by a reef, and should not be approached too close. After passing the Pinnacle Rock, the shores are bold on each side, the small rocks lying off the points showing the deepest water is on the West shore. Between *Ward's Island* and the main is a narrow channel of 3 fathoms, for small vessels. After passing *Ward's Island*, the soundings are regular, 10, 11, and 12 fathoms. *Somes' Island* is steep close-to, on each side. There is good anchorage at the head of the port in 8 fathoms, muddy bottom, about halfway between *Somes' Island* and the beach, with the summit of *Somes' Island* bearing South. The heads of the port will then be shut in, and you are well protected from southerly and north-westerly gales.

After having rounded Cape Terawiti or Poli-wero, vessels must not haul within three-quarters of a mile of the larboard shore, as there is a wash rock midway between that cape and Sinclair Head, and which lies about half a mile from the shore. The latter point may be known by its having off it a reef of black pinnacle rocks, and by the immediate recedence of the shore to the eastward. Having passed Sinclair Head, two jutting reefs of black rocks will be seen, and beyond them Lyall's (or False) Bay, which might be mistaken for the entrance to the harbour. Two more protruding reefs must be passed, and the entrance to Port Nicholson will be opened, and may be recognised by the isolated black rocks of Barrett Reef, then steer by the harbour chart.*

* Directions by Mr. Charles Heaphy.

Capt. W. H. Newby, who was here in July, 1849, makes the following additional remarks to the preceding:—

Mr. Dogherty, the pilot, generally boards vessels outside Barrett Reef, as notice is given from the signal station on Mount Albert, as before mentioned. His place on shore is inside a reef of rocks, where he has a house on the beach, not far from which appeared some part of the remains of the schooner wrecked there while working out with people leaving in alarm after the earthquake.

On our starboard side, among some rocks, there appeared like the ribs and truck of another wreck; I suppose it might be that of the *Tyne*, lost here some years ago.

The Barrett Reef is composed of nasty peaked pinnacles of rocks, sharp pointed at top, so that a vessel running in at night, and striking one of them, would be sure of having a hole knocked through her, and they are not very high out of the water.

Before coming to the entrance of Port Nicholson, there is a bay on the larboard side, called Lyall's Bay, which might be mistaken for the entrance by a stranger, in dark or hazy weather, when Pencarrow Head could not be clearly made out.

Off Pencarrow Head, for more than half a mile, lie some very nasty rugged rocks, above water, but scattered around points.

The passage on the West side of Barrett Reef does not appear to be safe for a heavy ship at all; there is water enough, but when the wind is so uncertain, and is so often caused to sally and shift through the high hills and range of Mount Albert, it would be unwise to attempt it, when the other channel is so much wider.

WELLINGTON, the new town, is immediately contiguous to Lambton Harbour. The water frontage of the town extends for about 3 miles around the beach, an undue extent, as alluded to previously. The site comprises the whole of the level spaces commonly called *Thorndon Flat* and *Te Aro Flat*, on the western sides of the harbour, and some of the practicable slopes of the hills. The native *pa* or village, called *Te Aro*, is one of the best commercial sites, and here three jetties have been built by the proprietors, and a vessel of seventy tons burden may load or unload alongside of them. Several strongly built warehouses and houses stand near the jetties, and in this part of the town are the bank, a chapel, &c., the custom-house, and the exchange. Numerous houses are dotted over the *Te Aro Flat*, the hollow between the bare eastern ridge, of which Mounts Victoria and Albert are peaks. On a slight eminence in the centre of this hollow, named *Mount Cook*, the jail and barracks are seen. Following round the beach, a continuous line of taverns, shops, and stores, among which a conspicuous object is the Scotch church, leads the eye to *Thorndon Flat*, near which stands the neat English church and parsonage, the residences of many of the principal inhabitants, buildings for the reception of immigrants, the principal, Barrett's, and other hotels. At this part of the harbour an excellent jetty has been constructed by the house proprietors, and thrown open to the gratuitous use of the public.

The situation of Wellington is highly picturesque. The steep wooded heights of Tinakore form a pleasing background to the view. Several streams from the

western range afford a constant supply of the purest water, of which vessels take in a stock with great ease, as they may lie at anchor in 3 fathoms water, so near the beach as to haul their long-boats backwards and forwards along a line stretched from the ship to the shore. The same means is also frequently adopted for discharging cargo.

Immediately adjoining on the North extremity of the town, a road leads up the side of a rugged hill, on which a cluster of small allotments, in a commanding situation, and well inhabited and cultivated, is called *Wade's Town*. From the same point of Wellington, a good road, the *Pitone Road*, runs along the western shore of Port Nicholson, close under the hills. At about half a mile along this road the gully of the *Kaiwarawara* stream makes a gap in the wall of foliage, and a small English village, as well as a native *pa*, stands on a part of the alluvial level which projects into the harbour. Here Mr. Mathieson built a slip in 1841, on which a vessel of 400 tons, and several others, were drawn up. The road still continues along the narrow strip of shore, here very rocky and steep, in several places some of the jutting buttresses of rock having to be cut away for it; and at some distance on is another but smaller break, where the *Nga Hawranga* stream enters the harbour. Here, too, is a native village. Steep wooded hills again bound the road for 2 or 3 miles beyond this; and in the latter part of this interval is a stream with a considerable fall of water, near the beach; less than a mile from this is the N.W. corner of the harbour, and from this point a sandy beach extends for about 2 miles, East and West, across its northern end. At this point a native footpath winds up the western hills towards the Harbour of Porirua, on the western coast, described presently. From a deep dell between these hills a brawling stream, the *Korokoro*, or "*Throat*," rushes into the sea.

On the broad sandy beach at the head of the harbour is the native village *Pitone*, or "*End of the Sand*." It was here that the first settlers landed and encamped. It is also the residence of Epuni, a native chief, who was exceedingly serviceable to the colonists in the skirmishes with the natives in 1846. In the N.E. corner of the harbour the Hutt River enters the sea by a single mouth; a short distance above which it separates into three branches, reuniting at a gorge, by which it issues from the country to the N.W.

With one or two exceptions, at the mouths of small streams, the whole of the eastern side of Port Nicholson is steep to the water's edge. The first of these is in a slight indentation of the coast, called *Lowry Bay*, which forms a shelter to small vessels from the opening of the harbour. Some houses stand on the beach. At *Okiwi* or *Hawtrey Bay*, to the southward, is another small cultivated patch. South of this the shore has nothing remarkable.

The peninsula which forms the western side of Port Nicholson is called *Watts's Peninsula*, and contains about 1,800 acres; and in its centre was a lake, Barnham water, now drained and cultivated. The isthmus between Lyall's Bay, on the South coast, and Evans's Bay, East of Wellington, is a sandy track, unfit for cultivation.

This briefly describes the entire circuit of this noble basin. As will be seen, it has been settled by colonists in almost all available parts. It is beyond the scope of this work to allude to the prosperity or success of these enterprises. One point

has certainly been too little dwelt on, and that is, the frequency of earthquakes. But few weeks elapse without some shock, slight or otherwise, occurring. Some of them have been severe. Whether their effects may have any influence on the rocks, shoals, or navigation, time must disclose. The ensuing brief observations by Mr. W. Holderness, on the winds, may conclude this :—

“Care should be taken to watch every indication of the barometer, for here, unlike the eastern coast of New South Wales, it falls with a S.E. as well as a N.W. wind; and with any lowering appearance to the south-eastward when near Cape Terawiti, accompanied by an unsteady N.W. or other wind, vessels should not approach too near the coast until the harbour is open, when they may safely haul in. Before the approach of a S.E. gale, when some vessels were lost, the barometer had fallen as low as 29·20, continuing so during the whole of Saturday and Saturday night, and then gradually rose on Sunday morning to 29·50. The barometer, used in conjunction with the thermometer, is invaluable. It may as well here be noticed, that the best anchorage seems, upon consideration, to be in mid-channel, between Barrett Reef and the eastern shore, rather than under Pencarrow Head; because in the channel the wind sets right down on it, and N.W. becomes a due North wind there.”

Capt. Cook, who visited this part of New Zealand in all his voyages, went chiefly to Queen Charlotte Sound, on the opposite side of the strait. During his conferences with the natives, and also from his personal observations, he concluded that some large inlet existed here. But on his quitting, in November, 1773, he sailed closer to this side of the strait, and, from the concealed nature of the entrance to Port Nicholson, he concluded that it did not run in so far as he first thought.—(Second Voyage, chap. 5.)

CAPE TERAWITI,* or POLI-WERO, is the easternmost projection on Cook's Strait, and it was supposed by Cook and Forster that it might form the West point of a separate island; but this is not the case.

The tide between Terawiti and Sinclair Head runs very rapidly, particularly off the former cape, with a race like heavy breakers. The tide in Cook's Strait runs North five hours and South eleven hours. Fortunately in these straits there are very few dangers that do not show; the gales always blow between South and East and North and West. They blow with great violence from both these quarters, but from N.W. they generally come on gradually: they shift suddenly from that quarter to the S.E., with exceedingly heavy squalls. When these gales come on, it is advisable to seek an anchorage (of which there are plenty) without delay.

MANA or TABLE ISLAND is about $2\frac{1}{2}$ miles long and 1 broad, and 12 miles north-eastward of Cape Terawiti. Its second name was given to it by Cook, from its appearance. The soil on it is good in some parts, where trees formerly grew, and the vegetation supports about 200 sheep, and thirty head of cattle. The proprietorship is, or was, the subject of dispute. The roadstead of Mana is a very bad one according to Dr. Dieffenbach, being open to the S.E. winds, with a strong tide setting in.† The island is flat-topped, and very steep to

* *Tc-ra-witi*, “the rising sun.”

† *Dieffenbach*, vol. i. p. 112.

seaward, but sloping down to the beach at the anchorage on the land side. Here there is a small whaling station, and a few sheep kept ; little or nothing else is to be had. Commander Hayes, H.M.S. *Driver*, says that ships may ride here safely in all winds that have no westing in them ; 2 fathoms will be found 10 yards from the beach. Mana is connected with the main by a ledge of rocks, the least water on which is said to be 3 fathoms, and is marked by kelp.

PORIRUA, a harbour on the coast opposite Mana, is only 15 miles from Wellington by land, as mentioned before. By sea there are no dangers, except a rock off *Karori*, near the *Seal Rock* ; the bearings are, from the Seal Rock, S.E. by S. by compass, three-quarters of a mile, and about $2\frac{1}{2}$ miles from the main land, and is nearly level with the water at spring tides. There is also a reef off Sinclair Head. There are two reefs which always show above the water at the entrance to Porirua. The harbour is formed by a branch of the sea, like a T : at the entrance is a bar with 10 feet, which breaks with N.W. winds, and is then dangerous for boats to cross. The coast between this and Wellington is very steep. A farmer lives here, who supplies the troops, &c., with meat and vegetables. Ships may ride safely here with all winds that have no westing in them ; but under Mana, which is close by, they may lay with any wind. Ships should on no account remain at Porirua with the wind N.W., as great difficulty has been experienced in getting out against the wind and heavy sea that then sets in.

KAPITI, the ENTRY ISLAND of Cook, stretches from North to South in an irregular and somewhat oval shape. It consists of a ridge of hills, rising in some places to the height of 600 feet above the level of the sea, with some of its peaks of a pyramidal form. These hills descend abruptly to the West and East, forming a rocky and nearly inaccessible shore throughout the greater part of its extent ; they are intersected by deep ravines, through which rivulets descend to the sea-shore. At the South end the hills are not so steep, and here the natives have their plantations. At the N.E. end the rock has been wasted by the violence of the waves, and its debris, with the sand, mould, and pumice-stone, brought down from the Tongariro Volcano by the Wanganui River, forms a band of low land around the N.E. end for about 3 miles, and is in some parts half a mile broad. In this beach there is a lagoon, about half a mile in circumference, and only separated from the sea by a narrow strip of land ; the water is brackish, from the sea being driven into it during gales.

Kapiti is about 25 miles in circumference, and is covered with a vigorous vegetation, mostly of trees, among which are some fine timber. It is, however, of small agricultural or commercial importance, but deserves attention in a military view, and, together with the three rocky islands at its South end, has for many years been a very important place for the chase of the black whale, but, like all shore-whaling, this is on the decline, and may be relinquished : in 1839 the produce of the establishment was 466 tuns of oil and 30 tons of whalebone. Fish of many kinds is taken at Kapiti in great abundance, and will become one day an important article of commerce. Herrings, mackerel, gurnets, flat-fish, skate, &c., may be caught in any quantity.

To the East of the South end of Kapiti is the small island of *Motu Narara* ; it is rocky, and about three-quarters of a mile in circumference ; on its North

end is a sandy beach, on which stand the houses of the European whalers and some native huts. It is separated only by a narrow channel from Kapiti, and opposite to it lies a little valley, the outlet of a rivulet, which has worn a channel deep enough for a small vessel at its mouth; here is a native village. On Motu Narara is a spring of fresh water close to the shore, but it is so small that water is generally procured from Kapiti.

Tauramoria, a barren, hilly island, little more than a mile in circumference, is separated from Motu Narara by a narrow and shallow channel. On its N.W. side are some native huts, and on the S.E. side is a whaling establishment. To the northward is *Evans's Island*, the smallest of all, a mere bare rock, just large enough to contain the huts of the whalers; but it is the most eligible place for that business.

By these islands and the South shore of Kapiti a roadstead is formed, sheltered from the prevailing N.W. wind by Kapiti, and from the S.E. winds by the three islets, and affording a safe anchorage for vessels. A ship coming from the northward, and passing between the main land and Kapiti, can approach E Hiko's Island (Kapiti) within about half a mile, taking care to keep clear of a reef near Evans's Island; or may enter from the South between Mayhew's and Evans's Islands in a clear channel.*

The coast between Kapiti and Cape Egmont is named by the whalers *Motherly Bay*, because the whales resort hither for calving, and have never yet been disturbed here. Mr. Wakefield states that he has seen them basking in great numbers outside the surf, between Manawatu and the Patea.†

The whole coast is a complete lee-shore, on account of the prevalence of north-westerly and south-westerly winds; a heavy swell sets towards the coast, and as the sea, to a great distance from shore, has only a little depth, ships are obliged to keep a good offing.‡

From *Waikanahi*, the native settlement opposite Kapiti, the western shore of Ika-na-mawi presents the aspect of low and irregular hummocks, either downs or covered with fern, and improving in fertility the farther they recede from the sea. This district is bordered, at the distance of 3 or 4 miles from the coast, by a wooded country, which rises gradually into ridges of mountains, covered with snow during the winter season. These mountains, which do not exceed 3,000 feet in their greatest height, belong to a congeries of hills running towards the centre of the island. Their outward shape is very uniform; they have everywhere the same longitudinal ridges with narrow crests, here and there rising to a somewhat higher summit. They form a good geographical division, as on one side the waters run into Cook Strait from Port Nicholson to Cape Egmont, and on the other to the East coast, into Hawke's Bay, or into Lake Taupo. The course of these rivers is short, rising as they do not far from the sea-coast; and from thence flowing between hills, they frequently become mountain torrents, bringing down large trees, especially pines, which become buried near the sea-coast. A great deal of drift-wood is thus found at all rivers, bearing but little proportion to the general size of the streams.

* Dr. Dieffenbach, vol. i. pp. 107—111.

† *Adventures in New Zealand*, vol. i. p. 340.

‡ Dr. Dieffenbach, vol. i. p. 130.

Of these streams may be mentioned the *Waikanahi*, the *Waimea*, the *Mahia*, the *Wai-e-rongo-mai*, the *Waikewa*, the *Ohou*, the *Waiwiri*, the *Oriwenua*, and the *Wai-te-rawa*, which are passed in rapid succession. At the Waimea a large tribe of natives is stationed; their fortified village or *pa* is called *Otaki*.

The MANAWATU is the largest of all these rivers; it takes its rise in the most elevated inland group, the Ruapahu. The force of its waters is not sufficient to remove the sand which is thrown up at its mouth by the S.W. and N.W. winds, and its depth over the bar is therefore only 7 feet at low water; the tide rises 8 feet. Its breadth at the mouth is about 300 yards at half-tide. The river has an exceedingly winding course. Inside the bar it deepens sufficiently to admit small vessels for about 50 miles. The natives of Taupo, in the interior, often descend it in their canoes. Its mouth, according to Capt. Smith, is in lat. $40^{\circ} 27' 23''$ S. It would appear to be of some importance to the colonists, as it is stated that there is an easy communication from its upper part with the Hauriri, or Ahuriri, falling into Hawke's Bay.

Directions for entering.—There are 7 feet water in the channel over the bar at low water spring tides; under the high bank, near *Pa Papangaio* (South bank), from $10\frac{1}{2}$ to 21 feet, at low water spring tides.

Vessels coming from the N.W. or S.W. should open *Pa Warangi* (North bank) clear of the breakers on the South spit, bringing the *North Beacon* to bear N.E. by E. $\frac{3}{4}$ E., and the *South Beacon* S.S.E. $\frac{3}{4}$ E.; the high peak of *Kapiti* will then be found S. by W. $\frac{1}{4}$ W., and the *pa* S.E. by E. $\frac{1}{4}$ E. Steer for the *pa*; sailing a little more than a quarter of a mile in this direction, the vessel will be in the most shallow part she has to cross, or on the bar; the water will be found to deepen as she proceeds. When she brings the *South Beacon* abeam, she must hug the North shore till she makes *Pa Warangi*, then steer for a beacon about 150 yards East of the *Pa Papangaio*, and hug the South shore, the deep water being under the high bank.

In making this river it should be observed that there is a remarkable grove of trees on the North side, about 3 miles inland. It is the first grove to the North of *Waikanahi* or *Waikanae*, and serves as a good land-mark.*

As above stated, the river has a very winding course, and one point on its banks, 36 miles by the windings of the river, is only 8 in a straight line from the sea. As far as regards depth of water, any vessel which can cross the bar can ascend the river for 52 miles from its mouth; but the tide does not flow so as to assist navigation against the stream for more than two-thirds that distance. After heavy floods, the water runs downward during both ebb and flow; a great deal of heavy timber is carried along to the sea, which renders precaution necessary in entering the river in the winter season.

Pa Papangaio, on the South bank of the river, is in lat. $40^{\circ} 28'$ S., lon. $175^{\circ} 8' 11''$ E. Spring tides rise 9 feet, ordinary tides 6 feet.

About 6 miles from the mouth of the Manawatu, the *Rangitiki*, a smaller river, also rising in the Ruapahu, falls into Cook's Strait. It brings down a great quantity of pumice-stone from the Tongariro.

* Cook's Strait Almanac, 1846.

To the westward of a line drawn from Otaki to the Ruapahu, and thence to Mount Egmont, the country is comparatively level. Across this district the Ruapahu rears its massy head to the height of about 9,000 feet, and is covered with eternal snows.

Several streams run into the sea between the Rangitiki and the Wanganui, but are smaller and of less importance; they are the *Wai Patiki*, the *Waikanahi*, the *Wai Kopuka*, the *Mahora*, the *Turakina*, the *Wangaiho*, and the *Kaitoki*. The coast here has a great sameness of appearance, and the mouths of these different rivers present little peculiarity when viewed from the sea. Near the Wanganui the water shoals for the distance of about 3 miles.

The WANGANUI RIVER enters Cook's Strait in lat. $39^{\circ} 55' 44''$ S. (Dieff.) Its entrance is half a mile broad, but at low water its depth does not exceed 8 feet, so that it will only admit vessels of moderate burden. The headlands of the river are low; a spit of sand runs off the southern head, and the channel is near the northern. At low water the sea breaks across the bar. Inside the bar the river deepens, and is about 300 yards broad; its banks here are low and sandy, and covered with drift-wood and pumice-stone, which the river brings down from its source in the Tongariro.

The *Clydesdale*, a bark of 250 tons burden, entered the river in 1841; and though she was run aground through not keeping in the right channel, she both entered and came out again without the slightest damage. East of the river's mouth, the high table-land does not reach within a mile or two of the coast; but on the western side it forms stratified argillaceous cliffs, containing recent shells and occasional lignite, which are washed by the sea at high water.

The Wanganui River, passing through a great extent of mountainous country, is subject to very strong freshets, which, however, do not rise above its present banks. On such occasions the surface of the stream is covered with pumice-stone, from the volcanic district around Tongariro, and drift-wood, which are found in large quantities all along the northern shore of Cook's Strait.

PETRE, about 4 miles up the West bank of the river, is a town founded in 1842. It was laid out nearly in the form of a square, of which two sides are bounded by the river, and a third by a steep wooded slope, leading to the high table-land. The situation is exceedingly picturesque, bold cliffs forming the opposite bank of the river. The town site itself is level, with the exception of two or three low sand ridges covered with fern. On one of these ridges was a stockade, in which a detachment of troops was quartered. A small church and a lock-up house, a post office and a school, all of wood, constitute the only public buildings of the little town, which had not more than thirty houses in it altogether. The first English settlers arrived from Wellington in 1842: in August, 1846, the white population of Wanganui was 186. In consequence, however, of the aggressions of the resident natives in June and July, 1847, the most lamentable disasters have, for the present, destroyed the little settlement.* It had become famous for hams and bacon, wild hogs abounding in all parts of the district. Fish of all

* A despatch of Governor Grey, describing the origin and prospects of these hostilities, will be found in *Papers on New Zealand*, presented to Parliament, December, 1847, p. 59; see also ditto, February 3rd, 1848, p. 8.

kinds common at Wellington abound off the mouth of the river; eels likewise abound. On the banks of a small tributary, called *Tangarakau*, which joins this river from the West, about 100 miles inland, *coal* has been found by the natives, but at present it cannot be made available.*

The ensuing *directions* appeared in the Southern Province Almanac for 1849.

From 5 to 8 feet water in the channel over the bar at low water spring tides; between the heads, 5 to 14 feet; the bluff, called the "*Landguard*," is on the South bank of the river, 2 miles from the heads; about half a mile above the lower end of it the water shallows, but deepens soon after. The town of Petre is 4 miles from the heads; abreast of the town there are from 8 to 24 feet water, at low water spring tides; and under *Shakspeare's Cliff*, opposite the town, 30 to 41 feet.

Vessels coming from Kapiti or Entry Island must steer N. by W. for 55 miles; on making the land, the Landguard is the most prominent object, as a dark steep bluff; on nearing the shore, the cliffs, one mile N.W. of the heads, will be seen, also the *Castle Cliff* and *Beacon*. *Taupiri*, or the Devil's Thumb (the highest mountain visible in that direction, except Tongariro, and appears as a double hump), and *Tongariro* are in a line with the heads, bearing N. 19° 12' E.

As the bar is a shifting one, vessels must look out for smooth water to enter in.

The coast from Wanganui to Cape Egmont presents a cliff of moderate height, on the top of which the land is flat, and rises with a very gentle slope towards Cape Egmont. In many places layers of *lignite* are found in the cliffs. The whole district possesses great facilities for agriculture, being covered with flax and fern. The forests begin at some distance inland.

The rivers along the coast from Wanganui are the *Waitotura*, about 20 miles to the north-westward, the *Wenuakuru*, the *Patea*, the *Tangahohi*, the *Waimate*, and the *Kukapuni*, all of which are small. There are natives on the banks of all of them, and Waimate is famous for a severe struggle between the natives and some Europeans wrecked in the bark *Harriet*, in which several were killed on both sides. Although it is stated that this was caused by the Europeans themselves, H.M.S. *Alligator* inflicted a severe and summary punishment on the natives.

The TARANAKI DISTRICT, which lies around the base of Mount Egmont, is described by all as the garden of New Zealand. Generally speaking it is level, except the broken ground in the courses of the numerous streams which flow through it. In some places, however, as at the Sugar-loaf Islands, volcanic formations protrude through the soil, which, near the sea-shore, is light, being intermixed with sand; but nearer the mountains it increases in depth and quality.

Many streams of various sizes take their rise in the sides of Mount Egmont, the most southerly of which is the Patea.

MOUNT EGMONT, which was named after the Earl by Cook in his first voyage, is one of the most remarkable mountains in New Zealand, and derives additional interest from the fact of its being generally the first land seen in

* Handbook for New Zealand, 1849, p. 208.

approaching New Zealand from Europe. It is a regular cone, rising out of the midst of the generally level country before mentioned, which circumstance causes it to appear of greater magnitude. From its base, which is about 30 miles in diameter, it rises by a gradual ascent to a regular cone, which is stated by Capt. Stokes, R.N., to be 8,270 feet; or according to Dr. Dieffenbach, who ascended it, it is 8,839 feet. Its peaked summit, an extinct volcano, is enveloped in perpetual snow, and that, too, for the distance of 1,635 feet below the top.* There is no record, traditionary or otherwise, of any eruption having occurred from it.

Its native name is *Pouke-e-aupapa*.

CAPE EGMONT (or *Boreel*) is the western extremity of the projection of the Taranaki district, and the N.W. point of Cook's Strait. Its longitude has been much misrepresented, and thus considerable distortion has arisen in the charts of this portion of the coast.

The coast here forms an obtuse point, which, rounding to the North and East, proceeds in a N.E. direction to New Plymouth.

Passing by the minor features of this coast, which, in a nautical sense, are unimportant, we reach the settlement of New Plymouth, the approach to which is indicated by some volcanic rocks, called the Sugar-loaf Point and Rocks by Cook.

SUGAR-LOAF POINT is a dome-like cone of trachytic porphyry, which rises to the height of 500 feet, and stands in an isolated position, with one side of its base washed by the sea. In its neighbourhood large boulders, consisting of volcanic rocks, apparently of old date, are cemented together into a solid conglomerate, which seems to extend, like a stream of lava, from Mount Egmont into the sea, but cannot be traced far inland. When the sea washes these rocks the conglomerate is particularly hard, the salt water appearing to have a chemical action on it.

A strong smell of sulphuretted hydrogen gas, and a constant succession of bubbles of some bituminous substance rising to the surface of the sea, may be observed about half a mile from high-water mark, between the main land and Moturoa, the highest of the Sugar-loaf Islands.

The SUGAR-LOAF ISLANDS are five in number. Three of them are very near the shores indeed. *Mikotai*, the northernmost of these three, is joined to the main by an isthmus, which is dry at low water of spring tide. *Moturoa* lies about a mile off this, with a deep water passage between them. It is a conical rock, extremely steep, about one mile in circumference, and 300 feet high. It is of volcanic structure. Prior to the settlement of this district by a large body of Europeans, the few natives remaining near the spot used to take refuge on this island from the predatory excursions of hostile tribes living to the northward. The huts which they used to inhabit on these occasions are perched in niches on different parts of the rock.

Motuo-mahanga, the outermost of the islands, is about $1\frac{1}{2}$ miles still farther to the West, also separated from Moturoa by a deep and safe channel. All the

* An account of this ascent is given in his travels, vol. i. pp. 155, *et seq.*

rest of the group, except Moturoa, consist of a softy ellow sandstone, elsewhere mentioned.

Immediately to the northward of Sugar-loaf Point is a whaling station, first established by Mr. Richard Barrett. This person, who has played a prominent part in the colonization of this part of New Zealand, had resided here for several years, connecting himself with the native tribes by marrying the daughter of the principal chief here, and by this influence, combined with his own good qualities and great influence with the natives, he was the means of purchasing the district of Taranaki for the New Zealand Company in 1839. His name is also recognised at Port Nicholson, where he was a great promoter of the New Zealand Company's cause. Honourable mention is made of E Diki, as he was known among the natives, by Dr. Dieffenbach, and by Mr. E. J. Wakefield, in their respective works; and he deserves especial mention here, as being one principal link between the primitive state of New Zealand and that of its present condition as a portion of the British dominions.

An inconsiderable rivulet, supplied by two small lagoons, filters on to the beach near this whaling station; a second station has also been established of late years.

About 2 miles North of Sugar-loaf Point is the mouth of a small river, the *Hua-toki*; about a mile farther is that of the *Enui*, or *Henui*; and a mile still beyond is that of the *Waiwakaio*.

NEW PLYMOUTH, a settlement formed by an English company, which merged into the New Zealand Company, in May, 1841, was selected in February, 1840, by Mr. F. Carrington. A block of about 700 acres, situate on the banks of the *Hua-toki* and *Henui*, and including all the land between these two streams for nearly half a mile back from the sea-beach, was fixed on as the site. Its nucleus has been formed at the mouth of the *Hua-toki*; on either bank of which are situate the residence and offices of the company's agent, two or three taverns, the jail, the court-house, and a few private stores and residences. There are also a church, a Wesleyan chapel, and another chapel. Several small farms, and knots of labourers' cottages, are scattered about at various distances from this centre; and North of the *Henui* there is a second church and another chapel. About half a dozen of these buildings, including the jail, the first-mentioned church, and the Wesleyan chapel, are built either of granite or sandstone, which are both found in the neighbourhood; the rest are built of wood.

The country is so level that little labour is required to make such roads as are necessary for the traffic of the settlement. The soil is of so dry a nature that, in many places, after merely cutting down the large fern, drays can pass in all weathers; and it has only been necessary to make bridges over the streams, and approaches by them down the sides of the gullies. This has been done over the streams mentioned; and, as there is a good ford over the river *Waiougona*, whose mouth is about 9 miles North of Sugar-loaf Point, there is altogether a very passable road from the town to the South bank of the Waitera, 12 miles northward of the same point. This line of communication is called the Devon Road.

The following ample and excellent directions for this roadstead appeared in the

Nautical Magazine for March, 1850. They are by Mr. Evans, master and assistant surveyor H.M.S. *Acheron* :—

“The settlement of Taranaki, or New Plymouth, is strikingly marked from seaward by a group of Sugar-loaf Isles, fronting it westwardly, and by its proximity to that snow-capped and Alpine-featured peak, Mount Egmont. This remarkable mountain, reaching an elevation of 8,270 feet, rises abruptly from a considerable level, in a cone-like profile, with a flattened summit, which is almost perpetually covered with snow.

“The settlement flagstaff, in lat. $39^{\circ} 3' 35''$ S., lon. $174^{\circ} 5' 31''$ E., is immediately above the landing-place, and close to the occupied portion of the town site. Mount Egmont bears S. $1^{\circ} 12'$ W., true, 14.45 nautical miles, and Moturoa, the highest of the Sugar-loaf Islands, N. $77^{\circ} 43'$ W., 2.05 miles from this position.

“The roadstead of New Plymouth extends from the Sugar-loaf Islands to a line North of the flagstaff: at an average distance of $1\frac{1}{4}$ miles from the shore there is a uniform depth of 10 to 12 fathoms; it is, however, not prudent for vessels of any size beyond coasting craft to come within this depth, as the bottom becomes very foul, with a reef, and an irregularly attached rocky ledge extending out a long half mile from the shore, a short distance westward of the flagstaff. The reef and ledge break in moderate weather, and shelter the landing-place from the prevalent S.W. winds and swell.

“The best anchorage is in 12 fathoms at low water, with the Wesleyan mission school (a remarkable building standing on elevated ground, midway between the town and Sugar-loaf Islands) in a line with Mount Egmont, bearing S. 18° E., magnetic, and the Seal Rock, midway between the two large Sugar-loaf Islands, bearing S. 41° W. magnetic. The flagstaff will then be in a S. 61° magnetic direction, distant $1\frac{1}{2}$ miles. The roadstead is open to all winds from S.W., round by N. to E.N.E. (18 points of the compass).

“The general nature of the bottom appears to be rocky ledges covered with a thin coating of dark-coloured sand; but North of the settlement it is strewn with large boulders and shingle. Vessels often experience difficulty in weighing, from the foul ground below the sand; a stout crown rope, to ensure canting the anchor, should always be employed. There is at all times a swell in the roads, and a vessel must be prepared to leave with the first symptom of a N.W. wind.

“Formerly a set of moorings, capable of holding a ship of the line, were laid down by the New Zealand Company to show the best anchorage. From the constant friction of a portion of the bridle-chains ($2\frac{1}{4}$ inch iron) on the hard bottom, and possibly a chemical action from the peculiar volcanic character of the district, the links were worn to nearly one-half their original stoutness in two years, and parted while a ship of 500 tons was riding by them. A duplicate set of moorings and two buoys are now lying at the landing-place; but the original mooring anchors, of about 70 cwt., and ground chains, have never been weighed.

“These moorings were far too large, and in the event of its being found expedient to lay down others, anchors of 35 cwt., with proportionate chains, would suffice. The present trade of New Plymouth scarcely warrants this outlay, neither can it

support the constant expense and attention that moorings thus situated demand. It must also be observed that the settlement offers no resource for any repair of iron work, in the event of the moorings requiring it ; and that for their examination a large sailing vessel must be especially equipped for the service. This vessel, whilst so engaged, has no harbour of refuge within 115 miles. The advantages to be derived from moorings in so exposed a situation are very problematical ; an organized boat establishment would prevent the necessity of large vessels risking their ground tackle by anchoring at all, and prove really beneficial to the general trade of the settlement, at a comparatively trifling expense.

“ In general, landing can only be effected in a whale-boat, or surf-boat, for general purposes, and under the guidance of an experienced resident boatman. The French government establishment consists of a beach-master and pilot, and a coxswain to take charge of the cargo-boats (capable of carrying about 3 tons each), with a whale-boat for general purposes. These boats perform all the duties of the settlement, both public and private ; they are manned, as occasion requires, by idlers, and labouring men seeking a job, natives or Europeans, as chance may offer, who are remunerated according to the number of hours employed. An experienced boat's crew can never be got together under the existing arrangement ; time is lost, and the service often inefficiently performed. The boats are well adapted for the service, are carefully looked after, and have hitherto been fortunate enough to escape accident.

“ A warping-buoy is laid down a short distance from the landing-place, and is useful for hauling the cargo-boats through the surf. The buoy kept in a line with the flagstaff is the best lead to the landing-place.

“ The Sugar-loaf Islands (in *Moari Nga-Motu*) are a remarkable and appropriately named group ; the most lofty and striking of these, Paretutu, rises from a low point of the adjacent main as a sharp cone, to an elevation of 503 feet. The inner islet (Moturoa) is similar in character, and 266 feet high ; whilst the outer (Motuo-mahanga) is saddle backed, with a conical summit 190 feet high. There is a deep passage between these islands, avoiding Barrett Reef (a half-tide rock), lying half a mile westward of Moturoa, and passing on either hand of the Seal Rocks, a cluster of some extent, the highest part having 35 feet elevation. With regard to the general character of the wind and weather, I have taken the report of the pilot and beach-master, and am indebted to the resident magistrate and New Zealand Company's agent for much information.

“ During the summer months, from November to February, there are pretty regular land and sea breezes, the latter from the S.W., and fiery light winds off the land during the night.

“ In the winter season the weather is variable, but the spring and fall of the year bring the strongest gales ; S.W. or W.S.W. is the prevailing quarter ; these winds throw a heavy swell round the Sugar-loaf Islands into the anchorage. South-east is the fine weather quarter ; and with this wind Mount Egmont is usually clear. North-west winds, which blow directly on shore, seldom blow home, and are generally preceded by a swell from that direction ; they do not come on suddenly, but back round from the N.E. and North.

“ From the beach-master's report of several years' experience, he considers that

a boat may be launched from the beach six days out of the seven, and the cargo-boats worked five out of the seven, on an average.

"It is high water on full and change days at $9\frac{1}{2}$, when the range of tide is 12 feet. In the offing strong currents are experienced, influenced by the winds: after a S.W. gale, during my visit to the settlement, the *Colonial* brig found difficulty in working against a N.E. current for two days, the rate of which along the land was fully $1\frac{1}{2}$ knots. On either side of New Plymouth the coast should be approached with caution, as there are outlying reefs and jutting ledges extending, as I am informed, fully 2 miles to seaward, with a heavy surf always rolling in on them."

The *Waitara River* is 12 miles from the Sugar-loaf Point. This river has a bar at the entrance, over which there are only 5 feet water at low tide, but inside the bar it deepens considerably, and 2 miles from its mouth Dr. Dieffenbach found its depth to be $2\frac{1}{2}$ fathoms. The *Waitara* does not rise in Mount Egmont, but comes from a hilly range which runs from Tongariro in a S.W. direction, and is called Rangitoto. It flows through a fertile and open country.

The *River Mimi*, which enters the sea at about 40 miles from the Sugar-loaf Islands, may be forded at low water. At its right bank is an escarpment, which consists entirely of sharp-edged volcanic fragments. An enormous quantity of drift-wood is imbedded in the sand, intermixed with human bones, probably the remains of cannibal feasts. The cliff on the coast shows here volcanic boulders kept together by a yellow loam. This formation is covered with sand. From the *Waiwakaio* to the *Mimi* the shore consists of sandy downs, and N.E. of the *Waitara* it becomes more elevated, the cliffs consisting of a stiff, blue clay. Between the *Waitara* and the *Mimi* are the Rivers *Onei*ro and *Urenui*, the latter a sluggish stream, flowing through a deep bed of white mud.

Near the *Urenui* the cliffs forming the shore are about 100 feet high, and Dr. Dieffenbach found a formation of wood, very little altered or carbonized, and 10 feet thick. A little beyond this again the shore becomes very picturesque, consisting of a soft, yellowish sandstone, which the waves of the sea have worn into the most fantastic shapes, which formation extends as far as *Mokau*.

The *RIVER MOKAU*, which takes its rise in the mountains of *Rangi-toto*, flows through a very fertile and moderately hilly district. On its banks are spots well cultivated by the natives. There were no natives between this and the present site of New Plymouth; and they had never been reached by European visitors or ships. "A brig once entered the river, and from the general aspect it appeared to me as if there was sufficient depth over the bar for vessels of moderate burden, at all events for steamers. Inside the bar I sounded, and found 3 fathoms; according to the natives there are $1\frac{1}{2}$ fathoms over the bar at low water. Inside the headlands the river takes a sharp turn, and forms a deep and completely sheltered basin."—(Dr. Dieffenbach, vol. i. p. 170.)

ALBATROSS POINT, a high, craggy point, was passed and named by Cook in his first exploration, January 10, 1770. It is in lat. $38^{\circ} 4' S.$, lon. $174^{\circ} 52' E.$ and forms the West point of the entrance to *Kawia Harbour*. It is probably the mountain mentioned by *Tasman*, which he then took for an island, in $38^{\circ} S.$

KAWIA HARBOUR is one of the most important on the western coast of the northern island. It has a clear entrance, about a mile and a quarter broad, and with 2 fathoms at dead low water, spring tides. The tide rises 12 feet; at full and change it is high water at 8^h. The best anchorage is along the northern shore, where the depth varies from 5 to 8 fathoms. The harbour forms an irregular basin, and is joined by two rivers, which descend from the coast range, and admit boats; the one to the North is the *Awaroa*, that to the South is the *Wai Arekeke*. On the North shore are still to be seen the extensive remains of the fortifications, trenches, and walls, built by Rauperaha about thirty years since, when he was driven from this place to the South. The principal settlement of the Waikato, who, at the period of Dr. Dieffenbach's visit, were in possession of that part of the island, was near the Wesleyan mission station, on the South shore.*

GANNET ISLAND, a very small island, lying S.W. $\frac{1}{2}$ W. from Woody Head, was thus named by Cook, from its having a great number of that bird upon it.

AOTEA is a long, shallow estuary, with a bar at its mouth, but has several times been entered by a schooner of 16 tons burden. On the northern shore is a Wesleyan mission station; and the native population amounts to 1,200.—(Dieffenbach.)

WAINGAROA HARBOUR is a long inlet with a bar at the entrance; it has, however, a channel of 12 feet at low water, and admits smaller craft, which find shelter in several bays on the northern shore. Off the northern and southern heads of the harbour are spits of sand, and the navigable channel is equi-distant from both heads. The tide rises 10 feet, and at full and change it is high water at 10^h. Several small vessels from Sydney, of about 60 tons burden, visit this harbour regularly, for the purpose of trading in salt pork and flax, which are or were obtained from a few Europeans who have settled here.

Two rivers empty themselves into the harbour, of which the smaller one comes from the northward, and is called Waingaroa. The larger one comes from the eastward, and is called *Wai te Tuna*; it has a channel for boats, and, from the point at which, on account of falls, it becomes impassable for boats or canoes, an easy walk of four hours leads to the banks of the *Waipa*. The large river flows in a direction parallel to the coast to the northward, and enters Waikato Harbour.

The northern head of Waingaroa consists of very picturesque limestone cliffs, 60 or 70 feet high, corroded by the action of the water, and half concealed by the overhanging verdure. *Woody Head*, or *Karaoe*, which rises with an easy ascent from the sea to a considerable height (Cook), forms the southern head of Waingaroa Harbour. The base of this group of hills is covered with wood or high fern, the rocky and craggy summit being about 900 feet above the sea level. This harbour offers many advantages for a settlement, as a communication with the interior is most easily established, and the land in its immediate neighbourhood is excellent, both forest and agricultural.

WAI-KATO RIVER and HARBOUR is the outlet of a considerable stream;

* Dieffenbach.

it does not form a bay, but is a narrow channel, where, at low water, only vessels of about 30 tons can enter. But inside the headlands the Wai-kato is a stately stream; and, when the tide has increased its depth, it is navigable even for larger vessels for about 100 miles, where it is joined by the Waipa, which is navigable for boats 60 miles farther.

The left shore of the Wai-kato consists, for about 8 miles from the sea, of shifting sand; the right shore is hilly, and at the foot of the hills, near the embouchure of the river, is the station of the Church Missionary Society, *Maraenui*, established about the year 1840.

Near the mission station are several native *pas*, numerous inhabited, but only during certain seasons, as the natives generally live in their plantations, higher up, on the banks of the river.

The sea-coast between Wai-kato and Waingarua consists of sandy downs for some distance; then it is hilly, assuming the character of plateaux and basins; farther still, sandstone cliffs draw close to the sea, and then buttresses of the main chain of hills run off toward the sea-coast, forming narrow valleys. Between the left bank of the Wai-kato and the coast the hills are steep on both sides, and run parallel to the coast, which consists partly of cliffs and partly of steep slopes, often rising to a height of 120 feet.

The distance from the Wai-kato to Manukao is 30 miles along the coast, which consists of a broad and hard sandy beach, with soft sandstone cliffs of a moderate height. There is only one spot that is impassable at high water, travelling along the shore. The whole district between the sea-coast and the *Awaroa* (Great River), which branches off from the Wai-kato to the North, 8 miles from its mouth, is called *Tauroa*. The soil is very light, and in some places sandy, but the kumera, of which there are many plantations, thrives very well in it. About 10 miles from the North head of the River Wai-kato sand has been carried by the winds a long distance inland, and is mixed with a great quantity of pumice-stone, which is often so firmly embedded in it as to form a pavement. This pumice-stone, and occasionally pieces of black obsidian, are brought down the Wai-kato River from the volcanic group of the Tongariro, from which the Wai-kato takes its rise.

MANUKAU HARBOUR is an extensive inlet, running from the entrance to the head of the inlet in its N.E. part, about 17 miles. Another large bay, diverging into several smaller inlets, runs to the S.E., making its breadth in this direction 11 or 12 miles.

The entrance of the harbour, with its banks, &c., was surveyed in 1844-45 by Mr. G. O. Ormsby, by order of the Government, and from his observations, and the description of Dr. Dieffenbach, the following imperfect account is gathered.

The distance across the country from Auckland to the head of Manukau (or Manukao) Harbour is about 7 miles; the land slopes gently towards the latter, and is covered with grass, flax, or the beautiful *veronica speciosa*, which, at the time of Dr. Dieffenbach's visit, was covered with its lilac flowers, filling the air with their perfume. Where this shrub grows it is a sure indication of the richest soil.

Between Auckland and Manukau there is no wood, excepting that, where the

plain is intersected by valleys, a few shrubs grow. At the N.E. head of Manukau are some native huts, called *Onehunga*, occasionally inhabited by a few people of the Wai-kato tribe, who have abundant crops on their neighbouring cultivations, especially of maize.

This arm of Manukau reaches within the shortest distance of the Tehmaki Channel, in the Hauraki Gulf; and between these points, as has been before mentioned on page 722, is the shortest portage connecting the eastern and western seas: this is an important feature in the geographical site of the capital of New Zealand, and may hereafter be of great service.

The upper part of Manukau Harbour is shallow, but there is a navigable channel for small craft nearly to its head. Part of the shore, at its head, is strewn over with hard basaltic lava and scoræ, and it is not difficult to point out, in a cove on the southern shore, the source of this volcanic produce.* The northern shore is clifty, and consists of stratified grayish sandstone, or sandstone conglomerate. The stratifications of the latter are sometimes curvilinear. The cliffs are covered with various trees; but this vegetation is nearly confined to the West, as the land which extends from the North shore of Manukau is not covered with anything of higher growth than fern, rushes, &c. This land consists of low hills, the upper soil of which has formerly been covered with kauri forest, as is proved by the gum or resin, of which pieces are everywhere found. This tree now only grows near the head of Manukau, and on the hills which extend along the sea-shore from Kaipara to Manukau. Several creeks, capable of turning mills, flow into the harbour.

The North head of Manukau is formed by three rugged conical hills; inside the outer head the coast presents a bold rocky precipice, alternating with small secluded bays; but a vigorous vegetation covers them to the water's edge, and kauri trees have grown in places where the precipice is inaccessible on account of its rapid declivity. About 5 miles from the outer headland the northern side of the entrance forms a peninsula, projecting a mile to the S.E.; and round this inner headland, close in shore, is the best anchorage in the harbour, perfectly sheltered from the N.W. and S.W. winds. A swell, which would be liable to set in from the harbour itself, is broken by a long sand-bank occupying the centre of the basin. This place is called *Karanga-hawe*, or *Karangahapi*, and is part of the land claimed by the Manukau New Zealand Company, who have named the site *Cornwallis*.

The southern shore of the harbour consists of undulating and fertile land, which extends from Onehunga towards the Wai-kato. There is a second channel on that side of the harbour; and a channel for boats extends towards an arm of the Wai-kato River, the *Awaroa*, with a very easy portage of $2\frac{1}{2}$ miles.

The South head is a remarkable steep hill of white moveable sand, heaped up by the north-westerly gales; the northern head, however, is a black conglomerate of a rugged shape.

Manukau is a place of some importance, from its near neighbourhood to Auck-

* These evidences of volcanic action may form a serious obstacle to the formation of any artificial works of magnitude here, such as canals, piers, or harbours; for should these now dormant powers again break forth, the labour and expense of years may be overturned in a minute. The fate of Wellington, too, points in the same direction.

land, and the facility of communication with that town and the River Wai-kato. The best anchorage, and all the timber, and moreover a very good situation for a town, are to be found on the northern shore; but all the good land is on the southern. To connect the two sides by a road will be difficult and expensive.

The great prevalence of westerly winds on this coast causes Manukau to be, in one respect, not nearly so important as it would seem. It is impossible to beat out of the harbour against a strong westerly wind, on account of the heavy sea raised on the banks at and outside the entrance. Consequently all egress for vessels is frequently closed for several weeks without interruption.

There are two or three considerable native villages on the shores of the harbour.

The ENTRANCE to the harbour consists of a contracted channel, on the side of which are the rugged hills, from 500 to 1,400 feet above the sea level. At the S.W. point of this land, that is, immediately on the North side of the entrance, are two conspicuous rocks, the outer one the *Nine Pin Rock*, the other a remarkable rock called *Paratutai*, close against the land, one-third of a mile N.E. of it. From Paratutai the outer coast runs to the N.W., and at the distance of $2\frac{1}{2}$ miles in this direction is *Ohako*, a remarkable cone close by the water. A mile and a quarter farther is another rock, called *Pararahi*. This part of the coast is fronted with a shoal, which runs out as far as the Nine Pin. The South side of the entrance, which in its western part is from $1\frac{1}{2}$ to 1 mile wide, is formed by the above-mentioned sand-hills, forming open fern land; and on the outer coast, at 4 miles S.E. from the Nine Pin, is a bluff, called the *Beacon Bluff*, on which, however, there was no beacon erected in 1845. In the channel immediately opposite the Nine Pin, and in the Paratutai, are from 19 to 24 fathoms, but to the S.E. of the former, a spit of 2 and $2\frac{1}{2}$ fathoms drives the deep channel over towards the North side. Southward of these two rocks is an extensive bank forming the South side of the entrance channel, within the East end of which there is a somewhat intricate passage of 15 feet least water. This shoal reaches for $2\frac{3}{4}$ miles from the land. Between the West end of this and the outer bar is the principal channel entrance, which will carry $4\frac{1}{2}$ fathoms least water in its centre. The outer bar is very extensive, and runs to the northward until it joins Pararahi, a distance of $5\frac{1}{2}$ miles. It consists of a series of shoal banks, on which the sea breaks very heavily; there is more than one apparent channel at intervals, the best of which, judging from appearances, is nearest to Pararahi.

To enter Manukau Harbour a vessel should be brought so that the conical hill, *Ohako*, to the North of the entrance, bears North by compass, and the *Beacon Bluff** E. by N. to E.N.E.; then steer North until the Nine Pin is on with Paratutai, bearing N.E.; then steer direct for the Nine Pin, pass close to it, and then up the harbour.—G. O. Ormsby.

In taking the harbour by the channel to the South, steer N. by W., keeping the starboard shore on board till the Nine Pin bears W.S.W.; then haul up into the harbour. The depth of water in the northern channel is 5 fathoms, in the southern 7 fathoms.†

* Some other directions say bring the *Table Mount*, a singular rising ground, with a flat or table-land on its summit, to bear E.N.E.

† Information on New Zealand, pp. 7—11.—Sydney, 1839.

The Nine Pin Rock is in lat. $37^{\circ} 2' 57''$ S., lon. $174^{\circ} 29' 4''$ E. High water, full and change, $9^h 30'$. Springs rise 12 feet. Variation, 13° W.—*G. O. Ormsby.*

The entrance to Manukau, although it is barred access from the S.W. by the before-mentioned banks, which entirely shut in the channel, yet strangers may distinguish this harbour by observing that the land to the eastward, for about 30 miles, is moderately high, and presents a ridge almost unbroken and straight. The beach, also, is straight, and uninterrupted by any projecting point of land the whole distance between Manukau and Waikato. To the northward of Manukau the coast presents an aspect rugged, uneven, and romantic, and is iron-bound some considerable distance from the North head.

KAIPARA is the next harbour in proceeding to the northward. It is stated that the first vessel which discovered the entrance into this port was the schooner *Fanny*, Capt. Wing, on January 6th, 1836, who, in entering the harbour, crossed the outer sand-bank, carrying 3 fathoms at high water, and worked out against a strong westerly wind by the middle channel. It had previously been supposed that there was no channel sufficiently deep to admit a vessel into this magnificent harbour. This is now accounted for by the fact, that there are two large sand-banks crossing the mouth of the harbour, extending beyond the headland on both sides, overlapping in the middle; and although one of these banks is at least 3 miles farther out to sea than the other, they appear to be one continued shoal quite across. When the entrance is approached from any point of the compass from N.W. to S.W., the distance from one headland to the other is about 6 miles, and the coast on both sides, with very few exceptions, consists of sand-hills. By attending to the following directions vessels of any size may go in with the greatest safety; but it ought to be kept in mind that it is not considered safe to go into Kaipara Harbour with an ebb tide, without a fair, steady, strong breeze. There are three channels, but the middle one is by far the best.

In sailing into the middle channel there is a remarkable black patch a few miles to the southward of the entrance; on the North headland there are three black patches: bring the black patch on the South side of the port to bear E.N.E. by compass; then steer direct for it until the middle black patch on the North shore bears N. by E. $\frac{1}{2}$ E.; steer for it until clear of the North end of the inner sand-bank; then shape your course for the inside point of the North head, off which good and safe anchorage may be found.

The foregoing is information by a gentleman who had been resident fourteen years at Hokianga.*

The next description is that by Dr. Dieffenbach.

Kaipara is not a bar harbour, but a channel harbour; it is a large basin, into which a tide, rising 10 feet at full and change, rushes with great velocity, which, joined with the narrowness of the channel and our imperfect knowledge of the soundings, certainly occasions great danger. Westerly winds, which blow without intermission during some portions of the year, and increase the current setting into the harbour, are another inconvenience, as they prevent ships leaving the harbour at all times. This, indeed, is the case with all harbours on the western

* Information on New Zealand, p. 6.—Sydney, 1839.

coast of New Zealand. Whether the shoals and sand-banks in the offing are shifting, is not yet ascertained, but it is not improbable that such is the case.

The harbour consists of several arms, which receive streams of fresh water; the westernmost of these is the *Wairoa*. At 130 miles from the heads of the harbour the breadth and depth of the river are equal to that of the Thames at Richmond, in England. It is navigable for canoes about 8 miles above this place, where their farther progress is prevented by rapids. The *Wairoa* rises in the hills on the northern slope, of which the *Waima*, an arm of the *Hokianga*, has its source. The *Wairoa* is soon joined by the *Otumatea*, a river coming from the hills in the neighbourhood of Wangari Harbour, and this receives in its line the *Oropasa* from the northward, and the *Kaiwaka* and *Waikaki* from the eastward. Not far from the junction of the *Otumatea* with the *Wairoa*, the latter is joined by the *Oruawaro*, another stream of considerable size, although, as is evident from the breadth of the island at this part from coast to coast, not of any great length. Lower down the *Tapara* from the South, and the *Kaipara Proper*, flow into arms of the estuary. The *Kaipara Proper* follows a very serpentine course in a moderate sized valley, formed by hills which bound the sea-coast between *Kaipara* and *Manukao Harbours*, and separated from an inlet of the Harbour of *Waitemata*, near *Auckland*, in the Gulf of *Hauraki*, by a piece of land about 3 miles in breadth, and consisting of low hills, over which the natives frequently dragged their canoes in time of war. This isthmus has been before noticed in connexion with the new town of *Auckland*, on page 722, not far from where the highest point to where the tide reaches in the *Kaipara Proper*, and the river joins it, which runs likewise within a very short distance of *Waitemata*.

The banks of the *Wairoa*, with the exception of those parts which are of very recent formation, and of the portions which have been cleared by the natives, are covered with a thick forest of timber trees of all descriptions, but especially of the *kauri pine*, which is always in the greatest profusion in hilly situations. I am not acquainted with any place in New Zealand where these trees are more plentiful, of greater height and diameter, and of easier access. The natives are constantly employed in felling and squaring them.

They also cultivate a considerable portion of ground, and will in time, perhaps, prove a valuable and wealthy part of the colony. Small vessels can go up the *Wairoa* as far as the settlement of a Mr. Stephenson, 85 miles from the heads of the harbour, where there is a depth of 12 feet; but only 15 miles lower down, at the farm of Mr. Forsyth, the river has water and a clear channel for vessels of any burden, and also anchorage close in-shore.

Timber is likewise found on the banks of all the other tributaries, especially of the *Otumatea*, and everywhere there is sufficient land to enable the colonist to combine agricultural pursuits with the timber trade. The inlet which is joined by the *Kaipara Proper* is navigable for large boats as far as the tide runs up. On the hills between *Kaipara* and *Manukao* there is much *kauri*, and the river affords great facilities for conveying the timber down to the sea.*

A long interval of coast succeeds to *Kaipara*, on which there is apparently no

* Dieffenbach, vol. i. pp. 264—268.

indentation or shelter. On the charts it has been simply marked as a bold shore. One mountain or hill stands conspicuous, *Mount Manganui*, in about lat. 35° 50' S.

HOKIANGA, or SHOUKI-ANGA, is the next place to be noticed. In former years this fine harbour, which is the outlet of numerous rivers, was much frequented for the splendid timber which grew in its 'neighbourhood, especially the kauri pine; but the larger timbers, and those fit for the navy, are nearly all gone; those that remain are good for logs, but not for spars, and therefore the timber trade is not sufficient to repay the settlers. The estuary is almost wholly formed by steep hills, which, after the kauri has been cut down, will not repay the trouble of cultivation. The estuary is joined by several fresh-water tributaries, which have a little cultivable land on their banks; this is especially the case at the principal stream, and at the Waima, near the entrance into the harbour; but the alluvial land bears a very small proportion to that which is clayey and useless. The good land is in the hands of the natives. The harbour, although a bar harbour, can be entered by large vessels; but since fine spars and cheap labour disappeared, the business of the place has greatly changed. Many of the European settlers have migrated to Auckland since Heké's rebellion. The first Wesleyan mission was established at Hokianga, and has been so effective that nearly all the natives are Christians.

Hokianga is noted for its wet climate and the thick fogs which envelop it long after the sun has risen above the horizon, whilst in other parts of the island they are scarcely ever met with.—(Dr. Dieffenbach.)

Lieut. Orlando Wilson, R.N., says Hokianga is a magnificent and easily navigable river. The bar at springs will admit vessels of 700 to 800 tons, if proper attention be paid to the state of the weather before edging down towards it. Should there be much sea on, then keep a station off the Three Kings, and dodge about them until the weather permits running down. The run is a short one from them, and, by strictly paying attention to the latitude, this will guide them to the harbour's mouth, which is remarkable for its bluff point to the South, and the sandy bights to the northward. I should be inclined to think that this bar may occasionally alter. The vessel I then commanded, the *Columbia*, was about 300 tons. I beat her up the river, backing and filling as occasion required (the tides answering well for that purpose), and got up about 45 miles, where I loaded. The Hokianga River is in some places 2 or 3 miles wide, and not only is in itself a magnificent stream, but its tributaries reach a long distance inland, some of them being navigable for vessels of 100 tons. One of these tributaries, the *Manga Muka*, is broader than the Thames.*

There appears to be some doubt as to the permanence of any given mark or direction for entering the river; and, as is evident, any notice that might tend to mislead is worse than useless, we can only give that which appears to be the latest and most authentic information, in the absence of any recent survey. The first is an official notice of the establishment of signals here, as published in the Van Diemen's Land papers, October, 1839. It is also given in Information on New Zealand, by a resident at Hokianga.

* Nautical Magazine, March, 1840, p. 150.

"This is to give notice to all captains of ships and vessels bound to the River Hokianga in New Zealand, that there is a flagstaff erected on the South Head, under the directions of Mr. John Martin, the pilot, with signal flags to signalize to any ship or vessel appearing off the heads; and the under-mentioned signals are to be attended to. Mr. Martin will be in attendance with his boat, also at the entrance of the Heads.

"Flag No. 1. *Blue Peter*.—Keep the sea; the bar is not fit to take.

No. 2. *Red*.—Take the bar; there is no danger.

No. 3. *Blue*, with a *White St. Andrew's Cross*.—Ebb tide, and the bar not fit to take.

No. 4. *White*.—First quarter flood."

It is necessary, when these flags are shown, that they should be answered from the ship, if understood, by a pendant or flag where best seen. The flagstaff works on a pivot; and when a vessel is too far to the southward for entering, the flagstaff will droop to the northward. If too far to the northward, will droop to the southward. Vessels to be particularly guided by the drooping of the flagstaff; for whatever way the flagstaff droops, the ship must keep that direction, and by no means take the bar until the flagstaff bears E. $\frac{1}{2}$ N., per compass. Time of high water, full and change, at the bar, 9 $\frac{1}{2}$ A.M.

It is necessary, however, to remark, that a very important change has recently taken place in the entrance of this harbour. The pilot affirms that the bar has shifted; others are of opinion that this is not the case, but that the best entrance, or the deepest water, has only recently been discovered; be this, however, as it may, the deepest water in crossing the bar will be found by bringing the South head of the harbour to bear East by compass; then steer as the pilot directs. It will, it is presumed, be quite satisfactory, in reply to the repeated questions proposed by merchants and captains of ships, relative to the safety with which vessels can enter the Port of Hokianga, to state for general information that the ship *Cornwall*, whose tonnage, per register, is 672 tons, entered that harbour, took a complete cargo, consisting of 213 spars, suitable for the English market, and went out again with perfect safety. It may not be uninteresting to strangers to be informed, that vessels may find safe anchorage in any part of the river after passing the South headland a little distance, to the extent of thirty miles. The ground generally occupied by vessels, which visit Hokianga for timber, is a little below a small island called Motili, which anchorage is about 26 miles from the entrance. There are, however, some respectable merchants not far from the heads, who occasionally load vessels with that article, in which case the anchorage ground is a little within or to the northward of One Tree Point.

The following is from the Nautical Magazine for October, 1839, p. 668 :—
 "When the *Coromandel* arrived off the Heads, we were proceeding to enter the harbour according to the old directions, with a smooth bar and light winds; but, as we neared the land, we observed the pilot-boat pulling out of the harbour towards us. The pilot boarded us before we reached the bar, and it was very fortunate for us he did so, as the bar had shifted very considerably, and a new channel formed, farther to the northward than to the old one. There is not more than 2 $\frac{1}{2}$ to 3 fathoms at high water (spring tides), over the old channel, but 5 at half-flood in the channel now open. The pilot was engaged in sounding the

entrance when we arrived, but I have not yet obtained the written directions from him which he has promised. The following particulars, however, will be a guide to masters of vessels entering the port, until I can furnish a more minute description. In entering the Harbour of Hokianga steer in for the land, until the flagstaff on the South Head bears E. $\frac{3}{4}$ N.; then stand in for a large black patch on the sand-hills, of the North side of the harbour, until the land at the South Head, which forms a small kind of bay, is well open; then haul over for the South Head, passing it close, in order to avoid a rock lying about half a cable's length N.W. from the head, and the river will open on the larboard bow, when the vessel will be past danger. A vessel must not attempt to enter at night, or if the blue flag is flying."

WANGAPE, or FALSE HOKIANGA, is 15 miles to the N.W. of Hokianga, and, as several serious mistakes have occurred, great caution is necessary in distinguishing between the real and the False Hokianga. The following account is from the source before quoted by the late resident at Hokianga.

Wangape is a small harbour, about 20 miles to the southward of Wharo, and about 15 miles North of Hokianga. The breadth of the entrance is about 200 yards: there is a rock a little to the northward of mid-channel, visible at low water. The best channel is between this rock and the South Head. I am not aware that soundings have been taken; but as I have often visited the place, and had a favourable view from an elevated situation, and never having seen breakers at the entrance, I conclude there is deep water. The channel inside continues about the same width as the entrance for 3 or 4 miles, with a chain of mountains on either side, and then expands into a beautiful bay. The shore is bold and iron-bound on both sides. This harbour has not been marked on any chart yet published; and as strangers, bound for Hokianga, have frequently mistaken Wangape for that harbour, it may not be amiss to remark that, in order to avoid this mistake, it must be kept in mind that the coast to the southward of Hokianga Harbour is bold and iron-bound, and that to the northward consists of a range of moderately high sand-hills, terminating in a range of mountains, extending to the South entrance of Wangape, but the coast on *both* sides of Wangape Harbour is very bold. The natives in this bay cultivate rather extensively, and have possessions and cultivations also at Hokianga, and no doubt, if the entrance were better known, it would become an interesting and valuable place.

The caution given in the preceding sentences is rendered much more essential from the fact that a native chief has erected a flagstaff at its entrance similar to that at Hokianga. In 1839 the New Zealand Company's ship *Tory* was nearly lost here, and in 1846 H.M.S. *Osprey* was totally lost through this unfortunate mistake. The *Osprey* approached the coast in the latitude of Hokianga, March 10, 1846, but was obliged to stand off on account of the fog. On the following morning, on nearing the coast, a high southern headland was seen similar to that at Hokianga, with what was presumed to be the pilot's house, but which subsequently proved to be a white spot on the cliff. Soon afterwards a red flag was run up, and the brig stood in, bringing the North and South Heads in one. She soon ran aground, and then came the alarming conviction that it was not the entrance of Hokianga, but that of *Haerekino*, or False Hokianga.

She became immoveably fixed on the sand, and all her stores were got out. The shore on this part of the western coast is extremely shallow for a long distance outwards, with a heavy surf and breakers continually rolling in, even when the wind is off the land; so that no vessel of proper size could approach the place to afford assistance to the *Osprey*. It was ascertained that the place is precisely a miniature Hokianga; and the principal native chief has adopted the plan of the pilot at the latter place, to announce high water to the smaller vessels that approach the settlement.

WHARO, an open roadstead, is the next place of consequence to the northward. The anchorage is good, on a firm, fast, sandy beach, and the supplies from the natives of fresh provision abundant at the proper season, viz., from January to the latter end of April or May, and it may be well to observe that, at the period above noted, ships may generally approach and anchor with the greatest safety, as the winds at that season of the year very frequently prevail from the eastward, consequently there is a smooth sea on the western coast.

CAPE MARIA VAN DIEMEN, the N.W. point of the North Island, has been before described on page 707.

THE MIDDLE ISLAND.

Pursuing the same course with this, the largest of the New Zealand group, we commence with its northernmost point, proceeding eastward and southward, and then terminate at this same point with our descriptions. As is well known, the attention of Europeans had been directed almost exclusively to the resources of the northern island during the first period of its occupation. Now, however, from the excellence of its harbours and many superior advantages, not the least of which is the paucity of the native population, there are numerous settlements along its shores, particularly along its northern and eastern sides. The South and western portions remain still comparatively unknown.

CAPE FAREWELL is the northernmost point of the Middle Island, and received its name from Cook, who passed it on March 23, 1770, and departed from New Zealand at this point, March 31st.* D'Urville says it is moderately high land, with a rapid descent to the shore, and at 3 or 4 miles South off it he had 62 fathoms, bottom of sand and mud. Off this cape he was carried considerably to the E.N.E. by the current or tide, as was evident by the change in it to the opposite direction at a subsequent period.

To the eastward of Cape Farewell a long sandy peninsula extends for 12 or 15 miles, nearly East and West, and terminates in a very narrow and low point. This tongue of land is very narrow, with small rounded downs, and some tufts of shrubs sparingly scattered over it. At a mile off the lead gives a regular depth of 7, 9, and 11 fathoms.

Beyond the low eastern extreme of this sandy tongue an extension of it under water reaches for more than 5 miles farther. The sea breaks heavily on it. At the eastern end of this, which has but very little water on it, it drops quickly to a depth of 12 and 13 fathoms. This bank is called *Entry Bank* by D'Urville.†

* Cook's First Voyage, chap. 7.

† Voyage de *L'Astrolabe*, vol. ii. pp. 19, 346-7.

MASSACRE BAY.—To the south-eastward of the bank running off Cape Farewell is an extensive bay, which Cook, in passing from Cape Stephens to the N.W. in a straight line, could not see the bottom of, and therefore, supposing it to be one large bay, called it *Blind Bay*. But when D'Urville came, he found that the space between Capes Farewell and Stephens was divided into two distinct bays by a remarkable point, which he named *Separation Point*. The bay to the West, named by Cook *Murderer's Bay*, he did not examine, but to that to the East the name of *Tasman Bay* was given. Massacre Bay, as it has been translated by D'Urville, has not been accurately surveyed, so that any detail cannot be given here. It was supposed by Cook to be the same as Tasman's *Moordenaar's Bay*.

There are two rivers whose valleys, in particular, are adapted to cultivation, that fall into Massacre Bay. These are the *Aorere River* from the West, and the *Takaka* from the South. On the coast at *Motupipi*, on the eastern side, the bed of a flat at low water is formed of bare coal; which, with a stratum exposed in the adjoining hills, has been worked since the year 1845, at the expense of some Wellington colonists, who purchased the section. The coal has been found to be exceedingly good.* *Motupipi* is about 8 miles from *Separation Point*, and the *Aorere* about 17 miles. There are small native villages, with cultivations appertaining to them, at various spots on the shores of Massacre Bay. There is a good roadstead, sheltered from all winds, under *Tata Island*, at the South end of Massacre Bay, affording anchorage, in from 3 to 4 fathoms, to a limited number of ships. This has been called *Victoria Haven*, and is distant about 2 miles from *Motupipi*, lying between it and *Separation Point*. The anchorage is said to be good in other parts of Massacre Bay, except in a strong easterly gale.

BLIND or TASMAN BAY is thus comprised between *Separation Point* on the N.W. and D'Urville Island on the East; at its bottom is the settlement of *Nelson*; thus the bay itself is an important one in the affairs of New Zealand.

TORRENT BAY is 11 miles to the South of *Separation Point*. In passing along the coast from the latter point, at 2 miles off, the depth gradually diminishes from 22 to 18, 13, and 9 fathoms, always mud. After passing two islets under the land the coast becomes lower, and leaves a broad beach of lower land, on which were some native huts. At about 9 miles from the point is *Tagai Island*, and then comes *Torrent Bay*. The bottom of this small bay is formed by the muddy river, which flows into it and discolours its waters. The entrance to the bay is between *Point North* and *Jetty Point*, nearly a mile apart. In its South part is a basin, of moderate depth however, $2\frac{1}{2}$ and 3 fathoms, which affords excellent shelter. This basin is only separated by an isthmus of 1,000 or 1,200 yards broad, from *Astrolabe Road* to the southward of it. At the time of D'Urville's visit, in January, 1827, there was a native village on the western shore of the bay, the natives of which were friendly to his party. Three fine torrents discharge themselves into it, and an immense forest of large

* See Report of Capt. Hoesason, of H.M. steam-vessel *Inflexible*, on the experiments with this coal.—*New Zealand Journal*, May 22, 1847, No. 195, p. 153.

trees occupies the bottom of the ravines by which these torrents discharge themselves.

ASTROLABE ROAD, named after D'Urville's ship at the time of its discovery, January, 1827, is formed by two islands, *Adele Island*, the northernmost, named after the commander's lady, and a smaller one to the southward of it, *Fisherman's Island*. *Point Adolphe* is the N.E. point of the entrance, and E.S.E. of it is a reef called *Apuka Reef*, and off the N.E. point of Adele Island, at about the same distance, is a *sunken rock* of 6 feet. The depth between these two detached shoals is about 10 fathoms, inside the northernmost it is $3\frac{1}{2}$ fathoms.

Adele Island is not above three-quarters of a mile in length, and off its North side, a mile distant, D'Urville's ship anchored. "The basin in which our corvette lay, sheltered from all quarters, presents the most picturesque scenes, and promised to our eager curiosity great discoveries. The land, agreeably varied, although generally hilly, the fresh verdure of the dark forests, the clearer spaces only covered with tall ferns, the fine sandy beaches, all gave a delicious enjoyment to our repose after the eight days of perilous navigation which we had had on this part of New Zealand."* D'Urville fixed his observatory on the beach opposite the N.W. point of Adele Island. To the eastward of it is the convenient watering-place, and South of it is *Cyathée's Beach*, the South end of which, *Point Percée*, forms the narrowest part of the passage between the island and the main. It is high water here at 8^h, full and change; spring tides rise 12 feet; and the variation was 14° East.

Between Fisherman's Island and Adele Island the channel, a quarter of a mile wide, is deep and clear. There is good anchorage, in moderate depths, to the southward and westward of these islands, well sheltered from most quarters; indeed, the whole of this side of Blind Bay is much more quiet to navigate than the *opposite*, which is more a lee shore, and subject to strong currents.

Kaiteriteri Bay is 5 miles to the southward of Point Percée, and runs in a N.W. direction; to the southward of this again are the mouths of several rivers, the *Reivai Eka*, and the *Motu Piki*, which flow round the base of *Mount Arthur*.

NELSON.—This settlement was the fourth that was founded by the New Zealand Company, and was planted in October, 1841, on a site chosen by Colonel Arthur Wakefield, who afterwards fell in the terrible massacre of the Wairoa, in 1843. This establishment is at the head of Blind Bay, and possesses many advantages of locality. If docks were to be formed, the proximity of coal, and other considerations, would place this port in a conspicuous position, more especially in reference to the steam navigation now on the increase in this portion of the globe.

"A curious bank of boulders, of no great breadth, and raised but 4 feet above the highest tides, which indeed wash over it in some low spots, runs along parallel with the land for about 6 miles, thoroughly sheltering a space, which averages a quarter of a mile in width, from the force of the sea. This natural breakwater joins the land at its northern extremity, but leaves a narrow gut between its southern point and the steep coast adjoining, at the very S.E. corner of Blind

* Voyage de *L'Astrolabe*, vol. ii. p. 28.

Bay. This gut is the entrance to Nelson Haven. Farther to the West a moderate sized river, called the Waimea, empties itself by several mouths into the sea. This river, and the waters which flow out of the haven, form a deep pool, sheltered by a bar. The bar extends from a spot on the seaward shore of the boulder bank, about half a mile North of its southernmost point, to the sands, which stretch out some distance from the low coast, extending 10 or 12 miles to the westward of Nelson Haven. On the bar are found 9 feet water, at low water spring tides; but the springs rise 13 or 14 feet on this coast. In the pool above described is excellent anchorage, as in stormy weather the sea is broken by the bar.

“From thence the navigation to the inner haven requires a practised pilot, as the tides are exceedingly rapid, and the channel very narrow. A peaked rock, called *the Arrow*, rises high out of water, not 100 yards South of the point of the boulder bank, and the ship channel is between the two.

“The inner gut, between the boulder bank and the main, is still narrower, but holds out less danger, as the tide sweeps fairly through it.

“Once inside this you may fancy yourself in a dock, except that a rapid tide sweeps along the land side for about a mile. The side toward the boulder bank is out of the influence of the tide, and there vessels generally anchor.

“The eastern shore of the haven is formed, for a mile from its entrance, by a low but steep ridge of hills that are bare of wood; but beyond this, the haven expands to the eastward into a broad space, which is a lake when covered by the tide, and a mud flat at other times, intersected by the branching channels of a small river called the *Maitai*. An amphitheatre of about 1,000 acres, shelving up from the southern side of this lagoon to the base of abrupt mountains on the East and S.E., seems made for the site of a town, and here Nelson is situated. It is only separated from the entrance of the haven by the ridge of hills above mentioned; and a path over its summit forms a short cut between the haven and the town. Facing to the North it enjoys a view over the wide part of the haven and the boulder bank into the expanse of Blind Bay; and the fringe of wood on the banks of *Maitai* leads the eye to the forest gullies and towering crags in the direction of the Oyeri or Pelorus River.

“It is a curious sight to see a large ship enter the haven under sail. The most favourable time to do this is with the full force of the flood, and against a working breeze that blows out of the harbour. Passing rapidly between the Arrow Rock and the boulder bank, she comes up head to wind, as her jib-boom is almost over your head while you stand on the beach, just above the gut, and she makes way on the starboard tack enough to shoot out of the tide, which has swept her half a mile up the harbour, into the eddy where she is to anchor.”*

DIRECTIONS.—It is advisable in proceeding to this port to keep the south-eastern shore on board, to avoid a sunken rock which is said to exist, and of which the following are supposed to be the bearings and distance:—The entrance of the harbour, S. by E. 7 miles; the outer mark on the white cliff, W. by S. $\frac{1}{2}$ S.

“From the best information I could obtain, I am of opinion that ships may

* Adventure in New Zealand, by E. J. Wakefield, 1830—1844, vol. ii. pp. 178—184.

anchor outside the bar without danger.* During the 14 days that we remained there the weather was extremely fine, although the wind was blowing hard from N.W. in the straits."

It appears that large vessels may go either in or out of this harbour with perfect safety, by taking advantage of the proper time of tide. The loss of the *Fifeshire* was occasioned in consequence of due attention not having been paid to this precaution. The passage is dangerous if a vessel be taken into it, on leaving the port, after the ebb tide has begun to make, but not otherwise.

The *Clifford*, a large emigrant vessel, was lying safely at anchor outside the entrance of the port, and inside the bar.

It is high water at Nelson at 9^h, full and change. Rise and fall of tide, 12 feet. Depth of water on the bar in spring tides, 22 feet.

PEPIN ISLAND has been before alluded to, and is visible from the western side of Blind Bay.

CROISILLES HARBOUR is 12 miles to the N.E. of Pepin Island, and is an excellent harbour. They were thus named by D'Urville.

CURRENT BASIN is the channel which separates D'Urville Island from the main. Its S.W. entrance, less than a mile in width, lies between *Hole in the Rock Point* to the South, and the extremity of *Labrun Peninsula*, to the North; off the latter is a rock. This channel was discovered and surveyed by D'Urville. "Our navigation," says he, "in this narrow and enclosed channel, between two chains of high mountains, had something imposing in it; on one side thick forests, on the other bushes, or only tall ferns; behind us Tasman Bay, extending to the distant horizon; before us the islands and islets of Admiralty Bay, appearing through the narrow pass as through an optical tube, and gradually swelling into view: such was the extraordinary spectacle which was before us for enjoyment, had not the anxieties of the navigation otherwise absorbed our attention."

The N.E. part of the basin is the narrow and rocky channel, named *French Pass* (*Passe de Français*). This passage is nearly entirely closed by rocks just awash. It is practicable, but very narrow, and the greatest depth is on the eastern side. The N.W. point of the passage extends into a chain of rocks even with the surface, which, closing three-fourths of the channel, so dams up the tidal waters, that it forms almost a perpetual bar in the only free part. Thus, during the vigour of the tide, it required the whole strength of six men, in a whale-boat, to stem it. When the *Astrolabe* was here, it was thought that low water was the best time for passing from West to East, but the current is then contrary. A fresh and leading breeze is absolutely necessary to attempt it. Close to the

* The bar of Nelson was found to have shoaled to 2½ fathoms. The bar can be crossed farther to the westward with 3 fathoms at low water, but there is more swell on that part. The direction of the bar is very regular, forming a slight curve from Port Howlett (inside Taiwas Head) to Port Heyward; it is also remarkably narrow, the distance from deep water outside to deep water inside not being more than 120 yards, so that vessels in crossing it can rarely get more than one or two casts of the lead on it. The ridge which forms the bar appears to have shifted inwards a few yards since it was surveyed in May, 1846, at a point which was formerly inside; and where there were 4½ fathoms there are now only 2½ fathoms. This may have been occasioned by a succession of N.E. winds, prevalent for many months, acting against the strong ebb tide.—Charles Kettle, surveyor, New Zealand.—*Otago News*, December 22nd, 1849.

barrier, and against the eastern point, the depth was tried at 20, 25, and even 45 fathoms, without finding bottom. A flock of cormorants, perched on the bushes on the shore, were the only guardians of this basin. The *Astrolabe* was repulsed at the first attempt, and was drifted back, making several turns by the opposing current. It is high water, full and change, at 8^h; springs rise 12 feet; and variation 14° E.

RANGITOTO* or D'URVILLE ISLAND forms the eastern side of Blind Bay. It is about 20 miles in length, by 5 or 6 miles in breadth. It is separated from the main by the narrow and dangerous Current Basin and French Pass, last mentioned. It is very hilly, and rises abruptly from the sea, and appears to be covered with a dense forest from the water's edge to the summit. Where no wood covers the steep sides of the hills, a barren-looking stratified rock appears.

Off its South extreme, that is, at the N.W. of the entrance to Current Basin, are some rocks called the *Pièges*, and 2½ miles West of it is a detached cluster called the *Chicots*.

PORT HARDY is at the North end of D'Urville Island, and is an excellent harbour. It runs into the southward, having an arm extending nearly at right angles to the eastward. It was the rendezvous of the ships which arrived with the first Wellington colonists, in January and February, 1840, before they had ascertained the site which had been selected for their settlement. Off the entrance of the port is a small rock called *Nelson's Monument*; and to the S.E. of this is a small cluster called *Victory Isles*, between which and the eastern side of the harbour rise some rocks, the *Flat Rocks*.

The harbour is an excellent one; the general soundings in the middle of it are from 12 to 15 fathoms. The tides set across the entrance, and vessels must therefore keep well to the East on the flood, and to the West on the ebb, but avoiding the reefs off *Nile* and *Trafalgar Heads*, the West headlands of the harbour, as the ebb from the West sets on them.

Nelson's Monument is in lat. 40° 44' S., lon. 173° 57' E. High water, on full and change, at 8^h; springs rise 12 feet.†

STEPHENS' ISLAND, as has been before mentioned, lies off the N.E. point of Rangitoto, and is of considerable height. The passage between Rangitoto (or D'Urville) and Stephens' Islands, should not be attempted by any but small craft, or by navigators well acquainted with the rocks and the set of the tides and currents.

Stephens' Island is the most projecting point, separating Blind Bay and Admiralty Bay to the East of it. On the eastern side of D'Urville Island is a village called Rangitoto, near which there is good anchorage for small craft. The natives have, or had, here a small tract of mountain land under cultivation for potatoes.

ADMIRALTY BAY is another of Cook's discoveries in 1770. Its entrance lies between Cape Stephens, the N.W. point, and Cape Jackson, its S.E.—“named after the two gentlemen who at this time were secretaries on board.” Cook says that Admiralty Bay “may be easily known by the island which lies

* Rangitoto, i. e., red sky.

† Cook's Strait Almanac, 1846.

2 miles N.E. of Cape Stephens, and is of considerable height." This bay is studded with hilly, wooded islands, of various sizes, and amongst these very good anchorage may be found. The largest of them is *Guard Island*, on the East side, about $2\frac{1}{4}$ miles long. Some natives generally reside here, having some productive potato grounds on the East face of the island. The channel between Green Island and the main land is only passable for boats.

At the S.E. end of Admiralty Bay is the entrance of *Oyeri* or *Pelorus Sound*, about a mile in width. The estuary immediately expands, and you continue to advance for 20 or 30 miles along a magnificent arm of the sea. The wooded mountains which enclose it are on the grandest scale, and the depth of water is 30 or 40 fathoms. Bays and harbours, many of them more capacious than Plymouth Sound, branch out in every direction. So numerous and varied in their forms are these ramifications, that it would be easy to mistake the track to the principal fresh-water river at the head of the sound. The whole scene forms a labyrinth on an immense scale, in which you may lose your way among tortuous paths of water, 2 or 3 miles broad, and between hedges, composed of mountains, from 2,000 to 3,000 feet in height, clothed to the summit with the most luxuriant and majestic timber. Even on a second visit some persons have been guided in the most intricate passes only by watching the set of the tide. Two deep bays, with valleys at their heads, stretching to the East and S.E., afford a communication with the West end of Queen Charlotte Sound and with the Wairoa Plain. The pass communicating with Queen Charlotte Sound is a neck of level land, only about 3 miles across from beach to beach.

Into the head of Pelorus Sound a considerable stream flows through a narrow valley, wooded at its lower end, but covered with fern and flax higher up. The whole district is without permanent native inhabitants, except countless flocks of wild fowl.

The front of Admiralty Bay is covered with a range of islands, of which those to the West are called *Admiralty Islands*, within which there is anchorage. The easternmost range is named the *Chetwood Islands*, and within them is Guard Island, before spoken of.

Between Guard Island and *Point Lambert*, the N.E. limit of Admiralty Bay, two or three bays stretch back among the wooded mountains. The westernmost of these, *Anakoa Bay*, is supposed to be 5 or 6 miles in length.

PORT GORE is the extensive inlet to the S.E. of Admiralty Bay, and forms a noble harbour of refuge for vessels caught by an adverse gale in Cook's Strait. The entrance is between Point Lambert and Point Jackson, which are 9 miles apart.

Melville Cove is the inner anchorage in Port Gore, lying in its S.W. corner, and protected by the peninsula, of which *Hart Point* is the South extreme. This point is in lat. $41^{\circ} 1' S.$, lon. $174^{\circ} 8' E.$ The turn and range of the tides are the same time as at all other parts of Cook's Strait. The inner anchorage of Port Gore lies to the West of this point. The surrounding land is very high and wooded. Except occasional visits, this spot is unfrequented by natives.*

* These later particulars are extracted from the Handbook for New Zealand, pp. 223—225. London, 1848,

In the southernmost angle of Port Gore is *Cockle Bay*, open to the North. Hence the S.E. side of the inlet trends directly to the N.E. to Point Jackson, which separates it from Queen Charlotte Sound.

QUEEN CHARLOTTE SOUND is, or was, one of the most interesting points of New Zealand, as it was here that Cook remained during each of the voyages in which he made so complete an examination of this till then *terra incognita*. It was also visited by Furneaux shortly after Cook's visit, during his second voyage. The following description of it is given by the great circumnavigator in the account of his first voyage.

The entrance of Queen Charlotte Sound is situated in lat. 41° S., and lon. $184^{\circ} 45'$ W., near the middle of the S.W. side of the strait in which it lies. The land off the S.E. head of the sound, called by the natives *Koamaroo*, off which lie two small islands and some rocks, makes the narrowest part of the strait. From the N.W. head a reef of rocks runs out about 2 miles, in the direction of N.E. by N., part of which is above water, and part below. By this account of the heads the sound will be sufficiently known. At the entrance it is 3 leagues broad, and lies in S.W. by S.S.W. and W.S.W. at least 10 leagues, and is a collection of some of the finest harbours in the world. The land forming the harbour, or cove, in which we lay, is called by the natives, *Totarranue*; the harbour itself, which I call *Ship Cove*, is not inferior to any in the sound, either for convenience or safety; it lies on the West side of the sound, and is the southernmost of three coves that are situated within the Island of Motuara, which bears East of it. Ship Cove may be entered either between the Island of Motuara and a long island called by the natives *Hamote*, or between Motuara and the western shore. In the last of these channels are two ledges of rocks, 3 fathoms under water, which may be easily known by the seaweed that grows on them. In sailing either in or out of the sound, with little wind, attention must be had to the tides, which flow about nine or ten o'clock at the full and change of the moon, and rise and fall between 7 and 8 feet perpendicularly. The flood comes in through the strait from the S.E., and sets strongly over upon the N.W. head, and the reef which lies off it; the ebb sets with still greater rapidity to the S.E., over the rocks and islands that lie off the S.E. head. The variation of the compass was found, from good observation, to be $13^{\circ} 5'$ E. (February, 1770.)

The land about this sound, which is of such a height that we saw it at the distance of 20 leagues, consists wholly of high hills and deep valleys, well stored with a variety of excellent timber, fit for all purposes except masts, for which it is too hard and heavy. The sea abounds with a variety of fish, so that, without going out of the cove where we lay, we caught every day, with the seine and hooks and lines, a quantity sufficient to serve the ship's company; and along the shore we found plenty of shags and a few other species of wild fowl, which those who have long lived upon salt provisions will not think despicable food.*

It was one of the first places visited in the primary examination made by the New Zealand Company in the *Tory*; and the naturalist, Dr. Dieffenbach,

* Cook's First Voyage, chap. 6.

thus speaks of it:—"The country was very picturesque, consisting generally of wooded hills, and forming a number of bays and coves on both sides. As I shall afterwards speak of several of those bays which I visited, and each of which forms a separate harbour, I will only mention here that, after having seen most of the good harbours of New Zealand, I still adhere to my first impression, that the sound is the most commodious and extensive, the most easy of access and navigation, especially from the regularity of the tides, and the most sheltered of any in New Zealand. Besides Ship Cove, East Bay and West Bay, and the proper termination to the sound, form inlets several miles long; in fact, the whole sound is perfectly land-locked, and has deep water close in shore. As a harbour it well deserves the enthusiastic praise which Capt. Cook bestows on it."*

POINT JACKSON, its N.W. cape, is a steep, clifty promontory, with a reef of rocks running out from it; on it are the palings of a native fortification.

Proceeding along its western side we come to *Cannibal Cove*, of Cook's chart, the *Anabo* of the natives, and to the southward of this is Cook's rendezvous, SHIP COVE, which has been previously alluded to. It opens in a semicircle towards Queen Charlotte Sound, and is formed by two branches of the network of mountains, of which this part of the island consists. The hills in the neighbourhood do not appear to average more than 1,200 feet in height; but the two highest hills at the back of Ship Cove were approximatively measured by Dr. Dieffenbach; the first, to the S.W. of the anchorage, is 900 feet high, and without wood on its summit; the second, covered with wood to the top, is about 2,093 feet high.

MOTUARA ISLAND lies to the N.E. and E. of Ship Cove; it is a steep ridge of hills, the most elevated points of which are on its northern and southern extremities, and bear N.E. and S.W. from each other.

WEST BAY of Cook, the *Naruawitu* of the natives, is very correctly laid down by Cook, with the exception that it turns again to the left, and its actual head is only separated from the southern arm by a narrow ridge of hills. Fine trees surround this bay, and the flat land, about a square mile in extent, bore marks of former native cultivation. Around the bay rise high steep wooded hills towering over it, and rendering it as smooth as glass. It thus forms a very fine harbour.

TE KATU, or LONG ISLAND, lies to the southward of Motuara. It is considerably larger than Motuara, but lying in the same direction. There is a good channel on either side of it.

ARAPAWA ISLAND, or ALAPAWA, or WELLINGTON ISLAND, forms the S.E. side of Queen Charlotte Sound, its insularity being determined by the *Tory* in 1839, and the strait to the southward, separating it from the main land, was named the *Tory Channel*. The island is about 15 miles in length, N.E. and S.W., and of an irregular breadth. There is a fine harbour on its N.W. side, called *East Bay*, the entrance being about 6 miles South of Cape Koumaru, the N.E. extremity.

West of the point where the *Tory Channel* joins Queen Charlotte Sound, the

* Dieffenbach, vol. I. p. 35.

latter extends about 10 miles nearly due West, the westernmost point being what has recently been called *Shakspeare Bay*, from which the level pass communicates with Pelorus Sound.

WAITOPE, or NEWTON BAY, as it has been lately called, is the next harbour on the South side of the sound, and has been recommended as the site of a shipping town to the Wairau Plain. The report on this bay states :—"The water continues deep almost to the head of Queen Charlotte Sound ; its width diminishes very gradually. It is 2 or 3 miles wide between the South end of Tory Channel and Newton Bay. The projecting points on the opposite sides of Newton Bay are from $1\frac{1}{2}$ to 2 miles apart, and the sound widens again above these points. There the soundings give 22 and 23 fathoms.

"With such a breadth and uniform depth of water, with the same abundance of deep and safe coves and harbours, with a singular freedom of rocks and shoals and sand-banks, the upper part of the sound, even above Newton Bay, deserves every praise that can be bestowed on it."

Newton Bay is thus described :—"At the mouth lies a little island, leaving a passage of about three-quarters of a mile wide on the East, and one of half a mile on the West. The soundings, which are 22 fathoms at the harbour's mouth, decrease within the islet to 17 fathoms, and then diminish very gradually, and with the utmost regularity, to 4 and $3\frac{1}{2}$ fathoms, within 100 yards, at most, from the shore, at the head of the harbour. The harbour, or cove, within the islet, may be called about $1\frac{1}{2}$ miles deep by $1\frac{1}{2}$ miles wide. The soundings across are as regular as those from North to South, in which direction the harbour lies. At the bottom of the cove, on the East and West sides, where the hills come down to the water's edge, there are from 4 to 7 fathoms within a boat's length of the shore. The bottom is sandy clay, with broken shells.

Milton Bay lies just to the N.E. of Newton Bay, and is separated from it by a narrow neck or peninsula of hills, joined to the main land by a level isthmus. It is also an excellent harbour, though more open to the sound than the other ; the soundings are as regular, the water generally as deep, but is not so great close to the shore.

Shakspeare Bay is immediately to the westward of Newton Bay. But a range or two of hills lie between it and the Wairau Pass. These three harbours, however, are so close to each other as to constitute but one group.

The TORY CHANNEL, as has been stated, separates Arapawa from the main land. It is a narrow but deep strait, having several coves and bays on either side. It was discovered by Mr. Guard in 1827, and surveyed by Capt. Chaffers in 1839, in the vessel whose name it bears. On the North side a town, to be called *Henderson*, has been projected. The eastern entrance of Tory Channel should not be attempted, except with a fair wind and tide, without an experienced pilot. It is exceedingly narrow, and the tide very rapid, both at ebb and flow. This entrance is contracted by a reef running off the N.E. entrance point to the southward, having on it a peaked rock.

The *flood tide* enters the South part of Queen Charlotte Sound through the Tory Channel, flowing up the wider portion of the sound until it meets the flood from the strait near Te Katu or Long Island, at the North entrance ; and the ebb

returns by the same route. But the numerous channels between the islands, and the peculiar formation of the land, together with the great force of the tide setting either way through Cook's Strait, generally require much experience and observation in order thoroughly to know their effects.

CAPE KOUMARU is the northernmost point of Arapawa Island; and *Wellington Head*, between it and the eastern entrance to the Tory Channel, is the point of the Middle Island nearest to the North Island. The narrowest part of Cook's Strait, between this headland and Cape Terawiti, is 12 miles across.

The BROTHERS, a group of rocky islets, lie off shore between Cape Koumaru and Wellington Head.

COOK'S ROCK, an exceedingly dangerous rock, lies to the N. by W. of the Brothers, right in the fairway through Cook's Strait. It was discovered and mentioned by Capt. Cook in his first exploration of this then unknown region in 1769, but singularly enough has been omitted in all charts. Thus it has been several times reported as a new discovery; once in the newspapers of July 30th, 1842, from Lloyd's. It has been called the *Carbon Rock*, having been seen by Mr. Lorie, master of the *Carbon* schooner. It was also seen by Capt. Newby, in the *Agenoria*, July 24th, 1849. He says:—"About 4^h 20' P.M., we were suddenly surprised by a rip of the water ahead, not more than a cable's length off. Put the helm aport to avoid it, when it seemed to be a huge brown rock, *just awash*, having a hummock or peak about the middle of it, like the fin of a right whale. The ship passed it very quickly; when it was abreast, the rocks called the Brothers bore S. by E. (about 5 miles), and Cape Terawiti's South extreme S.E.;* so that ships entering the strait from the N.W. should, after getting clear round Stephens' Island, bring the extreme point of Cape Terawiti to bear to the southward of S.E. before approaching the entrance to Queen Charlotte Sound. They would then pass clear to the eastward of this dangerous rock, which may be said to lay right in the farrows of ships passing through Cook's Strait."

The eastern coast of Arapawa (or Arapaoa) from Cape Koumaru runs nearly in a straight line, and is extremely steep, on which account many slips have taken place. It is scarcely possible to find a more iron-bound shore.

TE-AWA-ITI (the little river), or Tarwhite as it is called by the whalers, is on this side of Arapawa, and was the earliest settlement in Cook's Strait, having been formed by Mr. Guard, for sealing, in 1827. It was visited by the *Tory* in 1839, who found here about forty Europeans employed in the shore whaling, among whom was Mr. Barrett, the superintendent, who subsequently became of considerable importance in the affairs of the New Zealand Company. Te-awa-iti is on the East side of the Tory Channel, about 2 miles from its north-eastern entrance. The channel is here about 3 miles broad. Behind the settlement the land rises in steep ravines, covered with wood, or cultivated by the natives.

Above Te-awa-iti, towards the eastern entrance to Tory Channel, are two other bays, Wanganui and Hokokuri. The access between them is over the hills, or by

* Other bearings are—Cape Koumaru, S.S.W. $\frac{1}{2}$ W.; South end of Kapiti Island, N.E. by E.; and Long Island, in Queen Charlotte Sound, S.S.W.

water, as a protruding rocky shore separates them. There are, or were, three whaling establishments in this bay and in Jackson's Bay, a short distance from it; but their operations have been considerably reduced of late.

The southern head of Tory Channel forms a promontory, and is remarkable for the broken appearance of the rocks of which it consists. Through some excavations the waves rush from Cook's Strait into this channel. As the tide sets into this narrow entrance of the Tory Channel with great force and velocity, it must always be taken into consideration in running a vessel in. A pilot, Dr. Dieffenbach says, will generally come off from Te-awa-iti on a gun being fired outside the head, and is very necessary. Upwards of twenty years ago this southern cape was the scene of a sanguinary contest between the natives.

From the N.E. entrance to the Tory Channel to Port Underwood, in Cloudy Bay, the distance is about 20 miles. The coast between is very bold, from 200 to 300 feet high, and the sea breaks against the weather-worn rocks with tremendous violence; its aspect is dreary and barren, the formation being of a yellow schistous clay. In the whaling season (May to October) the boats running out from Te-awa-iti and Port Underwood are sometimes surprised by a gale, and obliged to run ashore, where they find scanty shelter in one or two small bays, and, remaining wind bound, frequently suffer much from want of provisions. All the points are familiar to and named by the whalers.

Proceeding to the S.W., *Lucky Bay* is a rocky and unsheltered opening. *Jackson's Boat Harbour*, of similar aspect, is the next inlet between the rocks. *Island Bay* follows: the coast here sweeps round in a large curve, forming the bay, which is thus named from a small rocky island near the southern shore, called *Glasgow Island*, from the name of a brig which rode out a heavy gale there. A furious tide sets into this bay, agitating the water even in calm weather.

Rununder Point is to the S.W. of Island Bay, and is a rocky promontory midway between the Tory Channel and Port Underwood. *Barrett's Boat Harbour* is a shallow bight: although boats must be hauled over fearful rocks, this place has often given shelter to whale-boats in distress. From this point a difficult path leads into Tory Channel, opposite Te-awa-iti.

Raumoa or *Fighting Bay*, a small bight, is beyond the foregoing; it is a place of some renown in the history of the sanguinary native wars. There is always a heavy swell in it. About 2 miles beyond this is an irregular mass of rocks, called the *Coombe Rocks*; there is a passage inside of them, at least for boats.

PORT UNDERWOOD is a spacious inlet, penetrating the land to the northward in the northern part of Cloudy Bay. It is about a mile wide at the entrance, and 4 or 5 miles in length. It is surrounded by lofty and barren mountains, particularly on its western side. There is but little level land on any part of its shores; the easiest road from one cove to another being in a boat. Whaling alone has attracted Europeans to this harbour, and the different bays exhibit ample evidence of this in the heaps of bones scattered on the shore. There are generally a few natives living in a village near the mouth of the harbour, but never numerous; and the whites are soon dispersed after the season is past. Besides the shore-whaling, Port Underwood has afforded shelter for the ships employed in that pursuit. The port is better adapted for whale-ships than

Te-awa-iti, as the anchorage is less distant from the entrance, and the rush of the tide is not so strong. Besides this, Port Underwood is ill adapted for any other purpose; not even the outer harbour, the only one much visited, is a first-rate one, as the prevalent gales, those from the S.W., blow directly into the entrance, and often drive ships from their anchors. The high and steep hills give it a gloomy appearance.

The head of the port is only separated from Queen Charlotte Sound by a chain of barren and steep hills. The largest bay, near the head of the harbour, is Robin Hood's Bay, where there is a native settlement. The western shore of Port Underwood forms, to the southward of this, a number of diminutive coves. The one next to Robin Hood's is *Ocean Bay*, with a large beach, and some extent of flat but shingly land. Here are, or were, two whaling establishments. The next is *Kakapo* or *Guard's Bay*. This is very small, and the hills surrounding it so high that the sun can be seen only for a short time. Mr. Guard, who discovered the Tory Channel, and formed the settlement at Te-awa-iti, first cleared the beach and settled here. Next to Kakapo is *Tom King's Bay*, also the station of a whaling party; another stands opposite to it.

On the eastern side of the port is the *Inner Harbour*, a spacious inlet, which has apparently deep water, and must be the best sheltered portion of the harbour. To the southward of its entrance is an island, formed, like the country, of clay slate; to the southward of it is *John Cove*. The *Entrance Point* is a rocky peninsula, having a line of sunken rocks extending from it a cable's length.

The point to a short distance to the N.E. of it stands, according to the observations made in H.M.S. *Conway*, in 1837, in lat. $41^{\circ} 20' 15''$ S., and lon. $174^{\circ} 10' 15''$ E.; var. 16° E.

CLOUDY BAY, in which Port Underwood lies, is a name derived from Capt. Cook, and is well applied, as rain must be abundant from the mountainous and wooded character of the surrounding country. Capt. Cook did not enter the inner harbour, now called Port Underwood. Cloudy Bay is limited to the South by a cape called the *White Bluff*.

The coast to the southward of Port Underwood continues steep and rocky for about 6 miles. Along the whole of this distance, with the exception of two places, where they recede and form two small coves, open to the S.E., their declivities are abruptly cut off, seaward, into craggy cliffs and broken rocks, hanging over and jutting out into the sea, and split and shattered into every variety of ruggedness. The coast then trends out to the East; the hilly range recedes to the S.W., and a broad sandy beach extends across the West end of the Wairau Plain.

The WAIRAU RIVER, which falls into Cloudy Bay, rises at about 65 or 70 miles from its mouth, in direct distance, among the high and snow mountains, from which also the Buller River flows to the West coast, and the Motueka and Waimea take their course towards Nelson. Some of its northern tributaries also flow in close proximity to Queen Charlotte and Pelorus Sounds. All these advantages, however, are reduced by the character of the entrance of the river: it has a bar across it, which renders it difficult of access, except in boats or calm weather.

"This bar will effectually render the operation of sending produce by it down to sea not to be risked with any wind but one off shore. The N.W. wind is such a wind. It generally prevails,* and then the bar is crossed with safety; but whenever this wind is violent, then is the impossibility, for small vessels certainly, to get into Port Underwood; while nothing but boats, or decked vessels of very small draught, could cross the bar at all. The depth of water on the bar was said by some persons to be 8 feet, by others 16 feet. What is certain is, that it varies according to the previous weather, a continuance of S.E. winds raising the bar considerably; while N.W. gales, or large floods in the Wairau River, probably lower it as much."† Inside the bar the river is navigable for boats and barges for 4 or 5 miles.

The Wairau is unhappily celebrated by the massacre of twenty-two Europeans, including Capt. Arthur Wakefield and other leading colonists of Nelson, on June 17th, 1843. This terrible event—an ample evidence of native treachery and ferocity—occurred during the adjustment of some land claims.

Southward of the Wairau Plain the shores of Cloudy Bay extend to the *White Bluff*, a remarkable cape, the southern extremity of the bay, and bearing directly South (*true*) from the entrance point of Port Underwood.

The *Kaipara-te-ao River* flows into the sea between the White Bluff and Cape Campbell, watering a plain resembling that of the Wairau in its general character, but not quite so large.

CAPE CAMPBELL is the S.W. limit of Cook's Strait, and is in lat. $41^{\circ} 40' S.$, lon. $174^{\circ} 27' E.$ Capt. Wilkes states that a line of rocks was seen extending to the eastward about a league from it, which do not appear on the charts; they are partly above and partly below water.

COOK'S STRAIT, separating the two principal islands, has now been described. From the imperfection of the charts, and the strong tidal currents met within it, its navigation has been deemed somewhat formidable. But this is a fallacy, and few such channels are more free from actual danger than this. In concluding our remarks on it, the following by Mr. Heaphy will be useful to those who wish to run through.

DIRECTIONS.—Vessels bound to Cook's Strait from the S.W. should make the land about 20 miles to the S.W. of Cape Farewell. The land about this part of the coast is high, and the distant mountains covered with snow. The high land suddenly terminates about Rocky Point, and a remarkable white way running down the side of the hill to the sea is very conspicuous, and easily seen at 30 miles' distance.

From the white way, or cliff, to Cape Farewell, the coast runs gradually lower; and, at about 20 miles' distance, the cape appears like a low island. There is a shoal sand-spit running off it, about 20 miles E. by N. After passing Cape Farewell, soundings may be obtained in from 54 to 49 and 44

* According to the information gathered by Capt. Wilkes, the prevailing winds at Cloudy Bay in summer and the beginning of autumn, from November to March, are from S.E. and N.W., which usually succeed each other at short intervals; during the rest of the year winds from South round to West are more frequent, and bring with them wet weather.—*Narrative of the United States' Exploring Expedition*, vol. ii. p. 409.

† Report in *New Zealand Journal*, July 1, 1848, No. 234, p. 150.

fathoms, fine muddy sand and broken shells. Vessels passing Cape Farewell in the evening may pass the night in safety by standing off and on Tasman's Gulf under easy sail, and keeping the lead going. The tide is not strong here, and the soundings regular, from 49 to 44 fathoms, fine dark sand; whereas vessels running up the strait in the night will get into strong tides, and, unless well acquainted with the coast, may run into danger.

The navigation of Cook's Strait is easy and less dangerous than the English Channel; and with a good lookout from the mast-head by day, and the lead going by night, a vessel may proceed to any part of the strait in safety.

In running up the strait on the South side in clear weather, Stephens' Island may be seen at 10 leagues' distance; the land is high and covered with wood: at the North end of the island are brown cliffs. From Stephens' Island to Cape Koamaru the land is high, with rugged peaks; and Cape Koamaru is easily known, being the highest distant land, with two white patches near the point of the cape, appearing at a distance like two sails under the land. The Brothers, two clusters of white rocks, about 40 feet out of the water, are an excellent guide for the cape. Point Jackson, forming the western entrance to Queen Charlotte Sound, is a low brown point, and may be known by a small black rock, about 6 feet out of the water, lying about a mile N.E. by E. of the point. The prevailing winds in Cook's Strait are N.W. nine months out of the twelve. In the winter months, June, July, and August, S.E. and southerly gales prevail; generally blowing in heavy gales, and shifting round suddenly to the opposite point. The S.E. gales generally cause a heavy sea, and, on the ebb tide, long tide-rips, which have all the appearance of breakers, and which cause has given rise to the erroneous opinion generally entertained of the supposed dangers of Cook's Strait.

On the West coast of Middle Island the prevailing winds are S.W. all the year; and during the summer months, December, January, February, and March, it blows with the greatest violence, and has been known to last for two months. On the eastern coast, as far as Cape Campbell, the N.W. and S.E. winds prevail all the year round. On the West coast of the North Island the prevailing winds are N.E. in the summer, and in the winter S.E. and N.W., but are liable to change to West and south-westerly gales, which in general do not last longer than twenty-four hours. A S.E. gale in general lasts four or five days. About Mount Egmont on the shore there is a regular land and sea-breeze during the summer, in the morning from the S.W., fresh during the day, and falling calm at night. Off the East cape, and along the coast to the North cape, in the summer months, the prevailing winds are north-easterly, but in the winter months strong westerly gales prevail.

The coast, which from Cape Campbell takes a south-westerly direction, is high and broken, with no level land in the vicinity of the sea: but, notwithstanding its abruptness, Mr. Couthouy, of the United States' Exploring Expedition, found only 14 fathoms at a distance of 4 miles from the shore, with a sandy bottom.

For the whole distance between Port Underwood and Port Cooper, on the North side of Banks's Peninsula, there is no harbour or river known to be capable of admitting large shipping.

At LOOKERS-ON, or KAIKORA, in about lat. 42° 20' S., lon. 173° 50' E.,

there is a point of low land, which affords shelter, on either side of it, to small vessels in certain states of the weather ; and here is a whale fishery, dependent on Wellington. The Lookers-on, as they were called by Capt. Cook, are two fine snowy peaks, supposed to be nearly as high as Mount Egmont, towering up in sharp points, covered with snow for 1,500 feet from the summit.* The land along this part of the coast is very rugged, apparently unsuited to any kind of cultivation, and has no harbours. We have no detailed particulars as yet of the coast southward of this to Banks's Peninsula. It has been examined by Capt. Stokes, in H.M.S. *Acheron*, but the results are not as yet laid before the world, except that the coast had been laid down 20 miles in error.

PEGASUS BAY is the extensive bight formed by Banks's Peninsula to the southward. At the *Double Corner*, a projection in the northern part of the bay, the range of mountains runs to the westward, and forms the northern side of the Canterbury Plains, which is to be the site of one of the most important and promising colonies of New Zealand. Two small rivers fall into Pegasus Bay, the *Waimakariri* and the *Putarekamutu*. We have no particulars of their capabilities of admitting vessels. Inland they are said to be navigable for boats nearly to the base of the mountains.

BANKS'S PENINSULA is one of the most remarkable projections in New Zealand. Its great nautical capabilities seem to be in a fair way of being eminently serviceable to the colony now in progress of formation. When Capt. Cook passed here in his first voyage, it was at so great a distance that he considered the isolated mass of hills of which it consists to be an island, and named it Banks's Island, from Mr. (afterwards Sir Joseph) Banks. Subsequently it was ascertained that a level tract of land united it to the main island, but this too was much misrepresented ; and it was not until the recent surveys in 1849-50, that its true character was ascertained. It is about 30 miles long, E.S.E. and W.N.W., and 20 miles broad, consisting almost entirely of steep rugged hills covered with wood. Several important harbours penetrate deeply into it on all sides.

PORT COOPER, or VICTORIA, is in the N.W. part of the peninsula, and, according to Capt. Stokes, R.N., is the most approachable of any anchorage he had visited in New Zealand. In the first place, its position being close to the N.W. end of Banks's Peninsula, always renders it recognisable to strangers from a considerable distance in clear weather ; in the second, the remarkably gradual shoaling of the water, a feature not before met with in these volcanic islands.†

Port Cooper, as it has been hitherto named, is the *Tokolebo* of the natives. The survey of the Canterbury colonists gives it the name of *Victoria*, and that of Port Levy adjoining, *Port Albert*. It is to be regretted that this interference with received nomenclature should have occurred ; in other cases it has led to much confusion, and has been frequently deprecated.

Godley Head,‡ according to the sketch survey made by Mr. Thomas, March, 1849, is in lat. $43^{\circ} 35' 52''$ S., and lon. $172^{\circ} 48' 20''$ E. ; according to Lieut. Raper,

* Mr. Couthouy, in *Narrative of the United States' Expedition*, vol. ii. p. 407.

† Letter to Sir F. Beaufort, Wellington, New Zealand, March, 1849 ; *Canterbury Papers*, No. 1, p. 24.

‡ Mr. Godley is the resident chief agent of this colony.

it is in lon. $172^{\circ} 54'$ E. This is the N.W. head of Port Cooper, and the distance between this and the eastern head of Port Levy is about $2\frac{1}{2}$ miles ; the point which separates the two entrances recedes a little from the general coast line.

Capt. Smith, in his report, says that Port Cooper is equally accessible with Port Levy, except in strong S.W. winds ; it has about the same depth of water, 9 fathoms, and the holding ground is equally good ; but on the whole, it is not considered so good a harbour as Port Levy, because the most prevailing and violent winds draw through it, producing a considerable swell. There is, however, near the entrance on the East side, a small bay, in which four or five vessels may lie nearly land-locked, and sheltered from all winds ; on the same side there are several small bays, which are excellent harbours for boats and small craft.

The shores are bold and rocky, the hills rugged, especially on the West side. The hills on the eastern side have a rounded and down-like appearance, with parallel and horizontal strata of volcanic rock on them ; they form three or four bays, previously mentioned, more or less deep, affording shelter to vessels, and each having some flat land at its head, available for building purposes, and for repairing vessels of easy draught of water. The sides of the hills on the western entrance are precipitous and abrupt for about $1\frac{1}{2}$ miles up the harbour, where there is a break in them ; they slope more towards the water's edge.

In the upper part of the harbour is an island, *Quail Island*, about 250 feet high. Above this the port divides itself into three bays. The water is shoal in all ; the middle bay is for the most part dry at low water. Port Cooper has been for many years the resort of whaling vessels, for the purpose of trying out the blubber, and the very numerous remains of their prey scattered about its head testify to the success of the operations.

PORT LEVY, or ALBERT, as it is named in the Canterbury survey, has also been called *Port Ashley*. It adjoins Port Cooper on the East, and penetrates the peninsula in a southerly direction.

Its easternmost head is rocky, though not high ; the westernmost (*Point Ad-derley*) which also forms one of the heads of Port Cooper, is high and perpendicular, receding a little from the general line of coast ; the entrance to these two harbours cannot easily be mistaken ; from this point the high lands of the peninsula begin to fall off toward the great plain to the westward. Port Ashley is about a mile wide, and about 6 miles long ; it is straight, its direction slightly inclining to the West of South.

The harbour of Port Levy is easy of access with almost all winds ; there is no bar ; the depth of water at the entrance is 9 fathoms, shoaling gradually to 3 fathoms opposite the native settlement, and there is no necessity for vessels to go higher for either wood or water, or for any other purpose. The usual anchorage is off the bluff, which in shape much resembles a sperm-whale's head ; the ordinary tides rise about 6 feet, the springs 7 feet. It is high water at the full and change of the moon about half-past five o'clock. The holding ground is a blue clay, and very firm. It is considered an excellent harbour, and well sheltered from all the prevailing winds. The North and N.E. winds which draw up the harbour, are seldom either violent or enduring. From the appearance of the hills, it might be supposed to be subject to flurries in N.W. and S.W. gales ; but it is said that

this is not the case, except in a trifling degree, as the former wind draws up Port Cooper, and the latter draws down, thus relieving Port Levy from their ill effects.

PIGEON BAY is another excellent harbour on the North side of Banks's Peninsula. According to Capt. Smith's report it is a deep inlet about 6 miles long, nearly straight, and from 1 to $1\frac{1}{2}$ miles wide. It is easily accessible, unless the wind is blowing strong from the S.W. It has no bar; the general depth of the water varies from 6 to 9 fathoms, increasing with tolerable regularity. The rise of tide is about 6 feet, at springs 7 feet. Pigeon Bay is generally considered a good and safe harbour. The prevailing winds, as in all other parts of the peninsula, are from N.W. to S.W., these are the most violent. Strong north-westers seldom blow more than six or seven hours; but if it works round to the S.W., which it sometimes does, it generally lasts days, seldom more. The holding ground is very good, and there are no dangerous rocks or shoals either inside or outside of the harbour. The country round Pigeon Bay is very hilly; that towards the entrance is well adapted to the depasturing of sheep and cattle, and is almost entirely covered with grass. Farther up the harbour it becomes wooded. On the West side, at about $3\frac{1}{2}$ miles from the entrance, there is a valley, through which a stream of water runs. At the head of the bay is a considerable extent of flat land, traversed by a fine little stream; at high water boats may go nearly half a mile up it, but they may land on the beach at all times of the tide, as the water is deep close to the shore.

At about 12 miles from Pigeon Bay, the intermediate coast trending to the S.E., is *Okains Bay*, running in a S.S.W. direction, and consequently open to the northward. We have no details respecting it. Hence the eastern extreme of the peninsula rounds to the southward and westward, but offering no good shelter as far as Akaroa Harbour, which is one of the best known of the whole.

The S.E. point of Banks's Peninsula is in lat. $43^{\circ} 52' 15''$ S., lon. $173^{\circ} 0'$ E. The entrance of Akaroa is about a mile West of this.

AKAROA HARBOUR is similar to the others on the North side of the peninsula, except that it runs in an opposite direction.

In the first part of this chapter allusion was made to the projected colonization of New Zealand by the French. Akaroa was the site of the first operations of this nation. Early in 1840 the first emigrants of a French association, the Nanto-Bordelaise Company, arrived in the Bay of Islands. But the English government there established took the precautionary measure of proclaiming English sovereignty in the Middle Island a few days previously. Thus the French company soon quitted the scene of their labours, which is now almost exclusively that in which the Church of England colony of Canterbury will fill.

The harbour, though a noble one, has not been so much frequented by whaling ships as might be inferred from its position, because the violent flurries of wind, from the high headlands surrounding it, render its narrow entrance rather difficult, and even dangerous.

The heads of Akaroa Harbour are remarkable; the South head is much the highest, with a reef running off a short distance; off the northern is a rock, in shape and appearance like a long-boat; the South Head is a perpendicular rock of a dark gray colour; the reef at the foot of it is not considered dangerous;

the breadth of the entrance is about three-quarters of a mile ; this is the narrowest part of the harbour.

It is not thought prudent to enter with a S.W. wind, as baffling and heavy squalls rush down from the high lands ; in moderate weather it is considered perfectly safe and easy of access ; the depth of water inside the heads is about 14 fathoms ; the only reef inside the harbour is on the North shore, off Green's Point ; it extends half a quarter of a mile from the point.

Running along the eastern part of Banks's Peninsula, the entrance to the Harbour of Akaroa may be known by a heap of large, flat, black rocks, which are off the northern part of the entrance. From the entrance to the anchorage is a clear passage of about 5 miles, from a mile to a mile and a half wide, and in one part, about one-third of the way up, not more than three-quarters of a mile ; there is no anchorage for the first 2 miles within the entrance, being open to the sea, the bottom rocky, and the water from 15 to 20 fathoms deep.

The anchorage is with the government flagstaff S.E. by E., and the extreme of a remarkable promontory at the upper part of the harbour, N.W. $\frac{1}{4}$ N., the depth 4 fathoms, mud. Wood here is most abundant, and water is to be found in large and rapid streams in several places, particularly one which runs past the house of the government resident. It must be rafted. Fish and cray-fish are plentiful ; the land all round this harbour, which is perfectly land-locked, is very high, and thickly covered with timber.

The tide is scarcely perceptible ; the wind blows generally in or out of the harbour ; a reef extends for half a mile from the southern head in an easterly direction, to seaward the sea breaks over it. It is necessary to be prepared for squalls of wind, which may be expected from the high land at entering or leaving the place. There are plenty of pigeons to be shot here in the woods, but great care should be taken not to go alone, or to separate from the party ; and few things are easier than to be lost in the thick high forest, and few things more difficult than to find the way out again.*

To the westward of Akaroa Harbour are two or three whaling stations on the coast, *Hikurangi*, *Pirangi* (or Piraki), and *Oihoa* (go ashore). The anchorage near them is bad, and completely exposed to the southerly gales, which often blow with great violence. One or two small vessels, which have anchored there to receive the oil and whalebone from the fisheries, have been consequently driven ashore and totally wrecked. At the westernmost of these, which is at the commencement of the shingle spit forming the Waihola Lake, is a lake (*Lake Forsyth*) which enters the peninsula in a E.N.E. direction.

The "NINETY MILES' BEACH" commences here. It is a continuous range of uniform shingle, without headland or bay, trending to the south-westward of

* In 1831 a horrible tragedy occurred here, through the instrumentality of the master of the *Elizabeth*, Capt. Stewart, from whom the southern island derives its name. Instigated by the hope of gaining a load of flax promised him, he took a tribe of warriors, headed by Rauperaha, from Waihanai in the North Island to the dwellings of the tribes they were then at war with. This bloody scheme was effected. The unsuspecting natives were surprised, and upwards of 1,500 were massacred in Akaroa and Port Levy. Fuller particulars of this transaction will be found in the *Nautical Magazines* for 1834 and 1846, and in the *Narrative of the United States' Exploring Expedition*, vol. II. p. 405. Stewart, it is said, was afterwards struck dead during a storm off Cape Horn.

Banks's Peninsula. For 17 or 18 miles to the West of *Oihoa* the shore is composed of a shingle bank, about half a mile broad, which separates the great *Lake Waihola*, or rather *Waiora*, called in the Canterbury survey *Lake Ellesmere*. This has an area of 74,000 acres, and occupies a large portion of the low isthmus which connects Banks's Peninsula with the main. This lake communicates with the sea by a narrow opening through this shingle spit, near its western end, which is closed for five or six months of the year.

To the S.W. of this end of the Waihola Lake the shingly beach continues for 60 miles, backed by grassy plains, extending to the foot of the principal ridge of mountains. These fertile plains, which are watered by numerous rivers, which cross this shingle boundary, the capabilities of entering or navigating of which have not yet been examined, are the site of the Canterbury settlement. It will be unnecessary here to give a mere enumeration of these rivers, as little is known of them. At about 35 miles farther, still along the shingly beach, we come to the Waitangi River.

The WAITANGI RIVER runs from West to East, through a vast plain of 40 or 50 miles in length, and about 12 in width, stretching East and West, without tree or shrub. It is a deep and rapid torrent, rushing through a labyrinth of gravel banks and small islands, and in summer much swollen by the melting of the snow on the mountains in the interior :* continuing to the southward at about 32 miles farther on, we reach Moerangi.

MOERANGI is a whaling station, but of a better stamp than those on Banks's Peninsula, the men having employed their spare time in agriculture, and having good crops of wheat and potatoes on the ground.

For 23 miles South of Moerangi there is a sandy beach, backed by hills ; at the end of which is Waikouaiti, 17 miles North of Otago Heads.

WAIKOUAITI is a settlement of English, who had, prior to the occupation of Otago, brought much of the land into cultivation. Mr. John Jones, a colonist from Sydney, has an extensive farming establishment here, at which he carries on whaling, and had a very large stock of cattle, sheep, and horses ; the crops in January were nearly ready for harvest, and some of the vegetation was as verdant as at Midsummer, the distance of the snowy mountains West of these parts of the island more than compensating, in respect to climate, for its southern latitude. There is here a station of the Wesleyan Missionary Society.

Between Waikouaiti and Otago Heads the coast is steep, so that the path between them lies over the hills. At a spot called *Blueskins*, 6 miles from Otago Heads, two or three settlers from Wellington formed an establishment in 1848.

OTAGO HARBOUR.—In 1843, in consequence of the dissensions among the religious parties in Scotland, an association was formed by the members of the Free Church of Scotland, to form a settlement in New Zealand ; and on their application, Port Cooper, on Banks's Peninsula, was assigned to them. On a subsequent exploration of the East coast of the Middle Island, made in the *Deborah*, Capt. Wing, in 1844, Otago, or *Otakou*, was determined on as the site of the future colony. The New Zealand Company, having received a crown

* Annals of the Diocese of New Zealand, 1847, pp. 116, 126.

grant, dated April 13th, 1846, of the territory in question, comprehending a well-defined block of 400,000 acres, the preliminaries were all arranged, and the first expedition of colonists sailed from England in December, 1847, and arrived in March, 1848. The new town was called *Dunedin*, and is at the head of the fine harbour called Otago.

The following extract from one of the early reports well describes the harbour. It is by Colonel Wakefield. The first impressions created by the sight of the harbour are extremely favourable. Lying open to the North, it is entered with a fair wind from the other settlements of New Zealand and from Australia.

This also prevents any delay at the heads on leaving the port. A fair wind out of the harbour takes a vessel soon free of the land, and, if seized at the commencement, may carry a ship of average sailing qualities to Cook's Strait in forty-eight hours.

The distance between Port Nicholson and Otago is 320 miles. There is no lee shore, except in the bays along this coast, with the winds that usually blow with any violence. That from the N.E. is known for its mild character. Its northern aspect, moreover, as facing the meridian sun, renders Otago much more agreeable than if it opened to the South, as do Akaroa, Port Underwood, and Port Nicholson. The morning sun enlivens every part of the harbour, which is protected from the cold wind by an amphitheatre of hills. The wind prevails from the S.W., which draws right down and out of the harbour; but this need not prevent a vessel bound to the place, and unable to enter the port in consequence of its strength, from anchoring in perfect safety; at about a quarter of a mile from the eastern head, *Tairoa's Head*, is smooth water of about 8 fathoms' depth, with good holding ground. Ample sea-room presents itself to strange vessels unable to fetch into the anchorage before nightfall. The sandbanks, which lie immediately within the heads, are of inconsiderable extent, and have, according to Capt. Wing, who sounded carefully all over the entrance, $3\frac{1}{2}$ fathoms at dead low water, spring tides. The tide runs about 3 miles an hour, and may be made good use of in working a vessel up or down the harbour; as the port is land-locked on three sides the sea seldom rises on the banks, and the sandy nature of the bottom prevents damage to small vessels touching on it. Pilots and buoys (which are now established) will render the channel extremely easy to navigate vessels not exceeding 500 tons burden up to the islands; but larger vessels will find safe anchorage a mile inside the heads, abreast of the village which has sprung up there from its having been the site of a whaling station, and the residence of the natives visiting the harbour on their voyages from Banks's Peninsula to Foveaux Strait. A great advantage presents itself at Otago over Port Cooper, in the abundance of timber and firewood that grow on its shores.

The general direction of the harbour is to the S.W. The entrance is narrow, a little more than a quarter of a mile only; and as there cannot be short of 30 square miles of tidal water within the current at the mouth is strong. *Tairoa Head* is the N.E. head, and is in lat. $45^{\circ} 46' 48''$ S., lon. $170^{\circ} 43' 12''$ E. The opposite point is a sandy flat. The harbour itself is divided into two portions, an outer and an inner harbour, by two islands that lie across it. The former portion

is about 6 miles in length, and the latter about 7. The average width of either is about 2 miles. The channels leading from one harbour to the other are narrow and deep. A great portion of the space within both harbours consists of shallows, and every tide uncovers several large dry banks. Near the entrance of the outer harbour, on its South side, is the settlement now denominated *Musselburgh*, a native settlement, also occupying the port side of the entrance. On the North side of the outer harbour are several bays, the innermost of which is at the junction of the outer and inner harbour, and is called "*Hoputai*, or *Port Chalmers*.

Of the inner harbour the shores on either side are covered with one unbroken forest; good timber is abundant.

DUNEDIN, the new town, stands at the head of this inner harbour. Here the character of the country entirely changes. The land lies in long slopes, or downs, upon which grows good grass, mixed with shrubs. To the eastward is an opening in the chain of hills which belt the coast between Tairoa's Head and Cape Saunders, across which extends a barrier of recent sandy formation, shutting out the sea, which in former times evidently flowed through what is now the harbour of Otago. The site of the town thus fixed at the head of the navigation of the port, and at the commencement of the rural lands of the settlement in their whole length, abounds in wood and fresh water. The waters of the harbour teem with fish of the best sort. The habouka, an excellent fish, of the cod kind, is taken in great quantities near the shipping town. Flat fish and oysters in all the bays.

Since the establishment of the Free Church colony here, the *outer* harbour has been regularly surveyed and marked by buoys as far as Hoputai, or Port Chalmers, and the following directions are appended to the chart of Mr. Charles H. Kettle.

Vessels should not attempt to enter against an ebb tide, without a strong commanding breeze, as the ebb from the North meets that coming out of the harbour near Tairoa's Head, and causes a strong set of current from that point towards *Point Heyward* (West side of entrance); should the wind be light, safe anchorage may be had outside in 7 fathoms water till the flood tide makes.

The deepest water will be obtained by passing Tairoa's Head at the distance of about a cable's length, steering S.S.W. $\frac{1}{4}$ W., till *Point Howlett* is brought abeam, and the soundings deepen to 5 fathoms, low water. From here the first *buoys* will be easily distinguished: the *red* one being on the starboard, the *white* one on the port side of the ship channel inside; and steering straight for them the water deepens from 5 to 10 fathoms.

If it be near low water, vessels drawing more than 15 feet should anchor about midway between Point Harrington and the red buoy, in 7 fathoms, till the tide rises, as the shallowest part of the channel lies between the first buoys.

The channel, up to Port Chalmers (Hoputai Bay), is marked by buoys on each side, placed in 3 fathoms water.

The red buoys are all on the starboard hand, and the white, red and white, and black buoys, are all on the port hand. By attention to these, which are numerous, and can be easily seen from the deck, a vessel of any size will have no

difficulty in going up and carrying from 5 to 10 fathoms all the way. After passing the black buoy opposite to Deborah Bay, steer for about 2 cables' length towards the New Zealand Company's store in Hoputai Bay, and anchor in 5½ fathoms, soft mud.

CAPE SAUNDERS, the southern point of the peninsula which forms Otago Harbour, is in lat. 45° 53' S., lon. 170° 50' E. To the westward of this the land forming the connecting isthmus is very low, and its appearance leads to the conviction, previously alluded to, that it is of recent formation.

The lands of the Free Church settlement of Otago extend along the coast now being described for the distance of 50 or 60 miles, between the mouth of the Otago Harbour and a headland called the Naggetts, about 3 miles S.W. of the Clutha. Of the range of coast between these points we have no authentic nautical information; it must, therefore, remain untouched on here. The southernmost portion of this tract of land is watered by the rivers *Puerua*, *Koau*, and *Clutha*, or *Molyneux*, besides a multitude of smaller streams.

COAL POINT is about 10 miles N.E. of the Clutha or Molyneux River. Mr. Tuckett, who, with Dr. Monro, examined it, says:—As we proceeded, about the time of low water, along the shore, I was gratified to observe very abundant large pieces of drift coal, of good quality; still no bed was visible in the face of the cliff. Farther on the beach became again rocky, and quantities of coal were lodged between the rocks, and soon appeared in view a *black cliff*. Approaching this cliff I found it to be a mass of coal for about 100 yards in length; in thickness from 12 to 20 feet, as seen in the face of the cliff above the sand, and to what depth it exists beneath the sand I could not ascertain.

The beach is not accessible, on account of the great swell and heavy surf. The coal, therefore, must be worked inland, and the bed will be, no doubt, discovered near the bank of the Clutha River, which, in a direct line inland, is probably not more than 4 or 5 miles distant (Report, pp. 41-2). This latter prediction has been verified. It has been found 4 miles inland, due West of Coal Point, and within a quarter of a mile of the left bank of the Clutha, 8 miles above its mouth. Different opinions as to the *quality* of the coal have been formed. A mining engineer near Glasgow states it to be splint coal, of first-rate quality.

The CLUTHA, MOLYNEUX, or MATOU RIVER, is a magnificent stream of nearly a quarter of a mile wide, deep, and with a moderate current. It is difficult of entrance, from the surf over the bar at the mouth, and from the circumstance of its having an invariable outward current. Beyond the bar it has 6 fathoms of water; and it is said to preserve its depth and width for 60 miles from its mouth. Respecting this last point, however, nothing very certain has reached us. Dr. Monro, in another place, says:—At Iwikatea the Clutha is a splendid river, upwards of 200 yards in width, with a deep steady current and definite banks. Each of the branches into which it divides is a large river, with a depth of several fathoms of water. But unfortunately at its mouth the river is contracted by a reef of rocks. What its navigable capabilities are has not yet been ascertained, but it is certain that its mouth is not easily accessible. By small vessels or steamers it might, generally speaking, be entered, but not by sailing vessels of any burden, except in particular states of the weather.—(New Zealand

Journal, No. 142, p. 233.) Mr. Tuckett, who selected the site of the colony, in his Report says that he was informed by a gentleman that he had ascended it in a boat for at least 50 miles, and that it was still navigable for a large boat ; also that many navigable creeks unite with it, by one of which a boat may be taken to a lagoon, called Katangata, and then by a narrow channel to another lagoon, called Rangi-toto, from whence the distance to the Tauri Valley does not exceed 6 miles—(pp. 42—46). Among the lakes which join the Clutha is the famous *T'avai-poenammoo*, or green talc lake.

We have but little accurate knowledge of the country to the South of this. The charts appear to be exceedingly defective, both in positions and detail. At *Tautuku*, 15 miles S.W. of the *Naggetts*, is a small whaling establishment, and a few white residents. A fine fertile upland country extends along the coast as far as the *Bluff*, or *Bloomfield Harbour*, a fine harbour at the eastern extremity of Foveaux's Strait. There is also here a whaling establishment and a few white residents. Immediately to the West of that harbour, a considerable river, called the *New River*, flows into the strait ; and about 30 miles farther a larger river, called *Aparima* or *Jacob's River*. Both of these are accessible for shipping of considerable size, though there is a bar at the entrance of the New River. At the mouth of Jacob's River there are about fifty Europeans, and a schooner of 190 tons was built and completely fitted out here in 1847, for the whale fishery.

Of STEWART or SOUTH ISLAND, or NEW LEINSTER, little is yet known. It contains about 1,000,000 acres of land, chiefly undulating, with a high mountain in its centre, and covered with wood. It possesses two fine harbours, *Port Somes* at its southern extremity, and the *Neck* or *Paterson's River* on its N.E. side, in Foveaux's Strait. Here about thirty or forty Europeans are settled, who pursue the whale and seal fishery, and possess a few cattle and sheep.*

Stewart Island was discovered, but not examined, by Capt. Cook, in his first voyage, 1770 ; he considered it to be part of the Middle Island. Its coasts were explored by the ship *Pegasus*, Capt. J. Chase, in 1809. It was then found to be uninhabited, abounding in wood fit for ship building and other purposes. The harbours of *Southern Port*, or *Port Pegasus*, were sketched with tolerable accuracy by W. Stewart, first officer of the *Pegasus*, afterwards commanding the ship *James Hay*. From him the name of the island is derived, and he has obtained an unfortunate notoriety from the circumstances alluded to on page 778.†

Capt. James Herd, of the *Rosanna*, visited it between 1822 and 1827, and makes the following observations on *Port Pegasus* :—This harbour, or sound, would contain the whole navy of Great Britain, secure from all winds ; at present it affords a station for the New South Wales seal-fishers, who are not very successful. A ship bound from India to Peru or Chili, may, in case of carrying away a topmast or yard, supply herself here, or recruit her water ; which, by the by, is not very good. When we were here it had a reddish tinge, and imparted that colour to everything it touched, and was also very astringent, which we

* Handbook for New Zealand, 1848, pp. 307—310.

† See Purdy's Tables, p. 90, where the first plan published will be found.

thought was caused by the decayed vegetables it ran through. This is the most rainy and boisterous part of the world I was ever in.*

Cable Island, which stands in the middle of the entrance of the two arms which constitute the principal part of the port, according to Lieut. Raper is in lat. $47^{\circ} 12' S.$, lon. $167^{\circ} 40' E.$ From its summit the South Cape bore $S. 33^{\circ} W.$, distant 7 miles; the S.W. Cape, $S. 49^{\circ} W.$, 9 miles; the Northern Traps, $S. 64^{\circ} E.$, about 5 leagues; and the South Traps, $S. 38^{\circ} 30' E.$, about 6 leagues; all by compass, the variation being about $17^{\circ} 4' E.$

The SNARES, a rocky group of islands to the southward of New Zealand, were discovered, November 24, 1791, by Capt. Vancouver. These were also seen by Capt. Broughton, in his consort, on the previous day. Capt. Herd says they are two groups, bearing $S. 38^{\circ} W.$, and $N. 38^{\circ} E.$, from each other. They are divided by a channel nearly 3 miles broad, in the centre of which the sea breaks in several places; the northern group is high, and covered with trees and verdure. The N.E. side of the group is accessible, and of gradual ascent, and the shores appear to have some fine sandy bays; the S.W. side of this group presents a dreadful precipice, on which the swell breaks with great violence.

The S.W. group consists of five or six barren inaccessible islets, or rocks, the sides of which are perpendicular, and covered with the dung of birds. There appears to be a number of shoals and reefs among the islands, so that, if possible, they had better be avoided. Vancouver says that they bear $S. 40^{\circ} W.$ 19 leagues from the South Cape, and $S. 62\frac{1}{2}^{\circ} W.$ 20 leagues from the southernmost part of the Traps.

Latitude of the eastern one, $48^{\circ} 3' S.$, longitude $166^{\circ} 45' E.$, according to Lieut. Raper.

The remainder of the South extreme of the group is very imperfectly known; the first point with which we are better acquainted is the rendezvous of Cook and Vancouver.

CHALKY BAY, or PORT SOUTH, was visited by Capt. Balleny, with the vessels belonging to the Messrs. Enderby, the *Eliza Scott* and *Sabrina*, prior to their discovery of the islands known by his name. They stayed here during the month of December, 1838, fully occupied in refitting, watering, &c. Though Midsummer, the weather was very stormy, with heavy rain. The following directions are given by Capt. Balleny.

When about 5 or 6 miles to the westward of Cape West, one sees the white cliffs of Chalky Island lying near the middle of the entrance; yet the cliffs are not of chalk, as might be supposed from the name, but of hard white rock. In running down to the S.S.E. from Cape West, you see the Table Rock (always from 10 to 12 feet above water) broad on the starboard bow. Table Rock bears S.S.W. (not S.E., as is marked in the plan in Duperrey's atlas) from the South point of Chalky Island. South-easterly from the Table Rock extends a very dangerous reef, on which the sea in bad weather breaks furiously, and at the southern extremity is a rock always above water; this reef, about a mile long, extends directly across the entrance of Chalky Bay, so that all ships ought to make Cape West.

* Nautical Magazine, 1832, p. 341.

There is no hidden danger in beating up the bay, but the soundings laid down are all imaginary; there are no soundings till within a few yards of the rocks. I worked up the bay with the deep sea lead going all the way, and I never yet struck the bottom. Only twice the schooner's length from the rocks, abreast of the cascade in *Deep Bay* or *Cunaris Arm*, we had an up and down cast with 80 fathoms and no bottom, yet it is marked on the chart 10 and 7. The entrance into Port North is narrow but deep, and at the top shoals, till there is scarce water for a boat.

Edwardson's Arm forms a splendid harbour. Port Chalky or Port South, on the South side of Chalky Bay, is the harbour generally used by ships visiting this part of New Zealand. In the entrance, and nearly in the middle, but rather nearer Garden Island, is a rock just visible at high water. Looking up Port Chalky, the first bight or bend of the land on the left is called *Ship Cove*, and off the point, where 10 fathoms are marked, a reef runs up the harbour, nearly one-third across the cove. The *Eliza Scott's* anchor was let go in 8 fathoms, and when she swung she struck on the reef; about three times the ship's length from the reef we had 22 fathoms. In mid-channel are marked 8, 7, 6, and 3 fathoms. Now the fact is, that in mid-channel are 35, 25, 22, 18, 15, and a short cable's length from the beach, 8 and 9 fathoms. The cutter *Sabrina* at one time rode close to the beach at the top of the harbour, and had 3 fathoms under the stern. The ground is good. The passage between Garden Island and the main is merely a boat passage, and full of rocks. There is not the vestige of a hut in Port Chalky.

Preservation Bay or Port, to the southward, is a picturesque spot, full of islands and covered with wood; the beauty of the scenery can hardly be described, but anchoring places are difficult to find, the water is so deep. The soil is good; most garden seeds and roots grow well, and rye-grass admirably. The plan of Chalky Bay and Harbour is good, with the exceptions already mentioned. There are no inhabitants on this part of the island: the ground, being covered with wood, produces myriads of flies of a very poisonous description; the bite of a mosquito is not to be compared to it for severity and effect; it is a small black fly, with a deep blue tinge. I saw no wild animals except rats.

The tide rises here about 6 feet, and it is high water, at full and change, at eleven o'clock.*

DUSKY BAY, an extensive series of arms, lies to the North of Port Chalky. It was examined by Cook, who has given a plan of it; Vancouver, too, has told us something of it. It is separated from Port Chalky by a peninsula, the West extremity of which is *Cape West*, and the narrow isthmus is between Cascade Bay and Edwardson's Arm. The following is from Cook:—

There are two entrances to this bay. The South entrance is situated on the North side of Cape West, in lat. $45^{\circ} 48' S$. It is formed by the land of the cape to the South, and *Five Fingers Point* to the North. This point is made remarkable by several pointed rocks lying off it, which, when viewed from certain situations, have some resemblance to the five fingers of a man's hand, from whence it

* Journal of the Royal Geographical Society, vol. ix. 1839, pp. 517—519.

takes its name. The land of this point is still more remarkable by the little similarity it bears to any other of the lands adjacent, being a narrow peninsula lying North and South, of a moderate and equal height, and all covered with wood.

To sail into the bay by this entrance is by no means difficult, as I know of no danger but what shows itself. The worst that attends it is the depth of water, which is too great to admit of anchorage, except in the coves and harbours, and very near the shores, and even in many places this last cannot be done. The anchoring places are, however, numerous enough, and equally safe and commodious. *Pickersgill Harbour*, where we lay, is not inferior to any other bay for two or three ships; it is situated on the South shore, abreast of the West end of *Indian Island*, which island may be known from the others by its greater proximity to that shore. There is a passage into the harbour on both sides of the isle which lies before it. The most room is on the upper or East side, having regard to a sunken rock near the main, abreast this end of the isle. Keep the isle close aboard, and you will not only avoid the rock, but keep in anchoring ground. The next place on this side is *Cascade Cove*, where there is room for a fleet of ships, and also a passage in, on either side of the isle which lies in the entrance, taking care to avoid a sunken rock which lies near the S.E. shore, a little above the isle. This rock, as well as the one in *Pickersgill Harbour*, may be seen at half ebb.

It must be needless to enumerate all the anchoring places in this capacious bay; one or two on each side will be quite sufficient. Those who want to be acquainted with more need only consult the chart (drawn up by Capt. Cook), which they may depend upon as being without any material error. To such as put into this bay and are afterwards bound to the South, I would recommend *Facile Harbour*.^{*} To sail into this harbour, keep the inside of the land of Five Fingers Point aboard, until you are the length of the isles which lie abreast the middle of that land. Haul round the North point of these isles, and you will have the harbour before you, bearing East. But the chart will be a sufficient guide, not only to sail into this, but into all the other anchoring places, as well as to sail quite through from the South to the North entrance. However, I shall give some directions for this navigation:—In coming in at the South entrance keep the South shore aboard, until you approach the West end of *Indian Island*, which you will know not only by its apparent, but real nearness to the shore. From this situation it will appear as a point dividing the bay into two arms. Leave this isle on your starboard side, and continue your course up the bay, which is E. by N. $\frac{1}{2}$ N., without turning either to the right or left. When you are abreast or above the East end of this isle, you will find the bay of a considerable breadth, and higher up, to be con-

^{*} Vancouver says:—"Capt. Cook's recommendation of *Facile Harbour*, to vessels bound to the southward, is highly judicious, as it is in all respects a safe, commodious, and convenient station, capable of supplying every article that can be expected from this country, without going out of sight of the vessel; and it is rendered still more eligible by our having found so good an outlet with northerly or N.W. winds, between Pigeon and Parrot Islands, which form the seaward face of the harbour, as, in consequence of the high land drawing those winds directly down the harbour, the western entrance will be found less convenient. No time should be lost on arriving at Dusk Bay to seek security in some of its harbours. The passage between Parrot and Pigeon Islands, though not exceeding a cable's length in width, is an excellent one, with soundings from 9 to 5 fathoms close to the shore. These soundings are on a ridge from island to island, as the water deepens to upwards of 30 fathoms on either side."—Vol. i. pp. 65-6.

tracted by two projecting points. Three miles above the one on the North side, and abreast of two small isles, is the passage out to sea, or to the North entrance, and this lies nearly in the direction of N. by W. and S. by E.

The North entrance lies in lat. $45^{\circ} 38' S.$, and 5 leagues to the North of Five Fingers Point. To make this entrance plain, it will be necessary to approach the shore within a few miles, as all the land within and on each side is of considerable height. Its situation may, however, be known at a great distance, as it lies under the first craggy mountains which rise to the North of the land of Five Fingers Point. The southernmost of these mountains is remarkable, having at its summit two small hillocks. When this mountain bears S.S.E. you will be before the entrance, on the South side of which are several isles. The westernmost and outermost is the most considerable, both for length and circuit; and this I have called *Break Sea Isle*, because it effectually covers this entrance from the violence of the S.W. swell, which the other entrance is so much exposed to. In sailing in you leave this isle, as well as the others, to the South. The best anchorage is in the first or North arm, which is on the larboard hand going in, either in one of the coves, or behind the isles that lie under the S.E. shore.

The country is exceedingly mountainous, not only about Dusky Bay, but through all the southern part of this western coast of Tavai Poenamoo. A prospect more rude and craggy is rarely to be met with; for inland appears nothing but the summits of mountains of a stupendous height, and consisting of rocks that are totally barren and naked, except where they are covered with snow. But the land bordering on the sea-coast, and all the islands, are thickly clothed with wood, almost down to the water's edge. The trees are of various kinds, and many of them are from 6 to 8 and 10 feet in girth, and from 60 to 80 or 100 feet in height.

ANCHOR ISLAND HARBOUR, as its name indicates, lies on the island in the mouth of Dusky Bay, on the North side of the island. It was in this harbour that Vancouver's ship, the *Discovery*, rode out safely a tremendous gale from N.W. by W., November 3—6, 1791. He states:—It appeared to be perfectly secure, and may be found convenient when accident may prevent vessels from getting into Facile Harbour. It has two entrances; that to the North of the Petrel Islands is a fair and clear channel, though of great depth, from 33 to 38 fathoms. In the narrowest part it is about a cable's length wide, and, I believe, free from any danger, as the shores are steep, without any sunken rocks or shoals, excepting within the passage close under the South side of Large Petrel Island, shown by weeds, and out of the way. The other passage is to the southward of the Petrel Islands, and as in all probability a strong northerly wind would alone induce any person to make choice of this in preference to Facile Harbour, the S.W. point of Large Petrel Island should be kept close on board, which may be safely done, in order to weather the rock that appears above water in the middle of the harbour, and to avoid a sunken one, of which there is not the least indication, and on which there is no greater depth than 12 feet at low water. Between this sunken rock and the point off which it lies, about three-quarters of a cable's length, and nearly in the direction to what I have called *Entry Island*, are 16 fathoms. Keeping the rock in the harbour, which is always visible, in a

line with what I have called *North Entry Island*, will be a sufficient direction to pass within the above-mentioned point and the sunken rock. Capt. Cook's chart of the port is excellent, and the only farther remark necessary is, that Anchor Island Harbour, although a very safe and secure port, is not a very convenient one to get to sea from, owing to its narrow limits, great depth of water, and the above sunken rock on its western entrance.

The WEST COAST of the Middle Island, between these last described bays and Cape Farewell, is almost a *terra incognita* in a nautical view. We have but the very vague accounts of passing observers in the South, or the remarks made by travellers on land for the northern section, neither of which can be of any service to the seaman. But very little can be said here on it.

For the space of nearly 250 miles from Dusky Bay the charts contain almost the entire information we possess. It is said there are some good harbours in the interval; but the rivers must be of small extent, because the mountain ranges here approach the shore. *Doubtful Harbour* (Point February, or South Point, about lat. $45^{\circ} 12'$, lon. $167^{\circ} 0'$), *Mary's Bay*, *Milford Haven*, lat. $44^{\circ} 32'$, lon. $167^{\circ} 45'$, and *Cascade Point*, lat. $43^{\circ} 55'$, lon. $168^{\circ} 30'$, are the most prominent features.

BOLD HEAD, lat. $42^{\circ} 57'$, lon. $170^{\circ} 40'$ E., was reached by a land expedition under Messrs. Brunner and Heaphy in March, 1846. They started from Nelson, and to their remarks the delineation of the coast is owing. For about 30 miles from Bold Head the coast is low, with a sandy beach. In this interval are the mouths of three rivers, the *Arahura*, or *Greenstone*, or *Brunner*, the *Teramakau*, and the *Gray River*, or *Mawhera*; the last is the principal. Its mouth is in about lat. $42^{\circ} 39'$, and is unavailable for any but small craft. The mountains between the valley of the Gray and that of the Greenstone do not approach within 30 miles of the coast; and a few natives, who live at the mouth of the latter river, report that there is an easy communication by the valley which it forms across the island to Banks's Peninsula.

At about 35 miles North of the Gray is a group of peaks, called by Cook, and also by D'Urville, the *Five Fingers*.* The coast in this space is iron-bound, with the exception of a beach about 8 miles long, not backed by any level country.

CAPE FOULWIND, a projecting part of the coast, lies about 16 miles North of the Five Fingers. The land about it is high and rocky. Off it are the rocks called the *Three Steeples*. The cape is low and covered with trees, lat. $41^{\circ} 46'$ S., lon. $171^{\circ} 29'$ E. The coast from Cape Foulwind trends first to the West, then N.E., and then due North; it is low and sandy, and in the bight of the bay thus formed is the mouth of the *Buller River* or *Kawatiri*, about 10 miles West from Cape Foulwind. Although larger than any of the rivers falling into the sea between this and Cape Farewell, the Buller appears to be unavailable for any but small craft, having a shallow entrance.

At 18 miles N.E. from the Buller River is the mouth of the *Ngakuhau*, North of which is a sandy beach, to which, however, the mountains approach closely. At this distance is the mouth of the *Mokihinui River*. The coast has an iron-

* Voyage de *L'Astrolabe*, vol. ii. p. 345.

bound character for about 10 miles in a N.N.E. direction to a sandy beach, 16 miles in extent, through which the River *Karamea* flows.

ROCKY POINT is in lat. $40^{\circ} 54'$, lon. $172^{\circ} 10'$ E. The coast for about 14 miles to the South of it trends nearly due North and South, a snowy range approaching close to the sea. Numerous small streams have their mouths along this coast, and there are two larger ones, the *Wahapoi* or *Heaphy*, 5 miles South of Rocky Point, and the *Haihai*, at its southernmost extremity. From Rocky Point to the N.E., for a distance of 35 miles, to the South Wanganui, the coast is rocky and iron-bound, steep spurs from the high mountains, composed of granite and gneiss, come down into the sea.

SOUTH WANGANUI is a very good harbour for small vessels, about 10 miles S.W. of Cape Farewell. Here there are extensive *coal beds*, equally easy of access with those in Massacre Bay, which are probably portions of the same formation.

CAPE FAREWELL, the northernmost point of the Middle Island, has been before described on page 760, and this completes the circuit of the group.*

It will be seen that many of the details given of this important country are exceedingly vague, far more so than its growing importance would demand; but as the requirements of the mariner will increase with the progress of colonization, all farther information must be acquired progressively.

CHAPTER XXII.

ISLANDS BETWEEN LATITUDES 20° AND 40° SOUTH.

THE immense extent of ocean comprised in this belt of the South Pacific, between the coasts of Chile and Australia, has but few, very few, spots of land in the southern portion. In the northern half the coral groups of the Low Archipelago extend to the South of, or within, our present limits, but will be described in a separate section hereafter. In pursuance of the principle stated on page 652, we return from the description of New Zealand in the West to the lower latitude on the South American coast, and thence again proceed to the westward.

JUAN FERNANDEZ ISLANDS.

This group, if it can be so designated, consists of two chief islands, at a considerable distance asunder, with some smaller ones attached to each. Their name is derived from Juan Fernandez, a Spaniard, who discovered them in his voyage from Lima to Valdivia, in 1563. He designed to settle here, and requested a patent for them, but did not obtain it. It was much visited by the buccaneers in

* Some rocks, called the *Farewell Rocks*, have been marked on some charts as lying about 10 miles to the northward of Cape Farewell, but it is stated that on a good lookout they could not be found. See *Nautical Magazine*, 1842, p. 810.

their marauding expeditions against the Spaniards, and Dampier describes his visits here. In 1681 a Mosquito Indian was left on it by the ship Dampier was in, and was taken off by him in March, 1684, he having lived three years solitarily, upon the goats first introduced by Fernandez.* In February, 1709, Capt. Woodes Rogers touched here, and found the well-known hero, Alexander Selkirk, who had been left on it by the ship *Cinque Ports*, Capt. Stradling, four years and four months previously, Dampier having been both in the ship he was landed from and that which took him off. Selkirk gave an account of his sojourn to Daniel Defoe, in order to prepare them for the press, and from the ideas there given the excellent romance of Robinson Crusoe was formed. In the visits above mentioned, a prodigious number of goats were found, but these were reduced by the Spaniards, who introduced dogs for the purpose of destroying one of the principal refreshments of their enemies the buccaneers. These animals were both found in possession of the island by Lord Anson, with the miserable remnant of his crews in the *Centurion*, the *Tryal* sloop, and the *Gloucester*, in June, 1741. Every one is familiar with the terrible descriptions of the havoc made by the scurvy in these ships, and the restoration of the survivors to health at Juan Fernandez. Men thus saved from utter destruction would naturally paint in glowing colours the scene of their deliverance; and these accounts leading to the supposition that the English would colonize both Inchin, in the Chonos Archipelago, and Juan Fernandez, the Spaniards sent a colony in 1751, but it was soon after almost totally destroyed by the dreadful earthquake, a calamity the island has since been subject to on more than one occasion. It was still inhabited when Carteret visited it in 1769. In 1819 the Chilian government formed it into a penal colony, but it was not much kept up, on account of the expense. When Capt. P. P. King, in H.M.S. *Adventure*, was here in 1830, it was occupied, or rather rented from the Chilian government for a term of years. In 1835 this prison colony had been increased, and the prisoners rose on, and for a short time overcame, the troops. This fact was related by Capt. P. Masters, which led to a counter-statement from the ex-governor, Mr. T. Sutcliffe, an Englishman. After this it was deserted, and at this period there is only one family, who supply the whalers and other visitors with firewood and goats' flesh, and also serve as guides to the island.† The following notices have been gathered from the works quoted below.

The principal islands are Juan Fernandez, called for distinction *Mas-a-Tierra*, because it is nearest the continent, and *Mas-a-Fuera*, or "more in the distance," which is about 90 miles West of it.

JUAN FERNANDEZ is about 10 or 12 miles long by 6 miles broad. It has

* Dampier's Collection, vol. i. p. 83, *et seq.*

† The numerous accounts of this island may be perused with much interest. Besides the extracts given in Burney's and other collections, they may be enumerated thus :—Dampier's Collection, vol. i. pp. 84—92, a good account; Woodes Rogers' Account of the Island and Alexander Selkirk; in Lord Anson's Voyage Round the World; Noticias Secretas de America, por Dons J. G. and A. de Ulloa, pp. 50—56, a good account; Bennett's Whaling Voyage; Voyage of the *Adventure* and *Beagle*, vol. i. pp. 302—308; Geographical Journal, vol. iv. p. 183; Nautical Magazine, June, 1837, pp. 360—363; The Earthquake of Juan Fernandez in 1835, by the Retired Governor (T. Sutcliffe), Manchester, 1839; Four Years in the Pacific, by the Hon. Fred. Walpole, 1849, vol. i. chap. 14, p. 353, *et seq.*; and numerous other authors.

several bays, and its general appearance is thus described by Capt. P. P. King, who anchored in Cumberland Bay, on its North side, January, 1830.

"I have seldom seen a more remarkable and picturesque view than is presented by the approach to Juan Fernandez. When seen from a distance, the mountain of the 'Yungue' (anvil), so called from its resemblance to a blacksmith's anvil, appears conspicuously placed in the midst of a range of precipitous mountains, and is alone an object of interest. It rises 3,000 feet above a shore, which is formed by an abrupt wall of dark-coloured bare rock, 800 or 900 feet in height, through whose wild ravines, broken by the mountain torrents, views are caught of verdant glades, surrounded by luxuriant woodland.

"The higher parts of the island are, in general, thickly wooded, but in some places there are grassy plains of considerable extent, whose lively colour contrasts agreeably with the dark foliage of myrtle trees which abound on the island.

"The Yungue is wooded nearly from the summit to its base, whence an extensive and fertile valley extends to the shore, and is watered by two streams, which take their rise in the heights and fall into the sea.

"This valley appears to have been formerly cleared and cultivated by the Spaniards, who had a colony here; for the stone walls, which served to divide their enclosures, still remain. From Walter's Account of Anson's Voyage, and the view given with it of the commodore's tent, there is no difficulty in determining this valley to be the spot on which his encampment was placed.

"The dwellings of the settlers are erected on the flat land at the North side of the bay, where the soil is richer than in other parts, and where it is more sheltered from the squalls which, during strong southerly gales, rush down the valley of the Yungue, the situation of the former establishment, with great violence.

"The remains of a fort, called San Juan Bautista, are yet in a tolerable state; it is situated on a rising ground, about 130 feet above the sea, at the S.W. part of the bay, and overlooks the village. In the middle of the beach are some ruins of a four-gun battery, and there are traces of a fort at the N.W. end of the island.

"By sending a boat to the East point of the bay, to fish in 40 fathoms water, a most delicious kind of cod-fish may be taken in such numbers, that two men in half an hour could fill the boat. Crawfish, of large size, are almost equally abundant; they are taken with a hooked stick; one of our boats caught forty-five in a very short time. The inhabitants catch them and cure their tails, by exposure to the sun, for exportation to Chile, where they are much esteemed, and fetch a high price.

"Fort Juan Bautista is in lat. $33^{\circ} 37' 45''$ S., lon. $78^{\circ} 53'$ W."

The next extracts are from the notes of Capt. Peter Masters, of Liverpool, who came hither in 1835.

French Bay is small, and the curve which forms it differs but little from the direction of the outer part of the coast. It affords no shelter, and is situated at the bottom of a valley which rises quickly to the high land, presenting a pleasing appearance, being well covered with trees, some of which were very large. Between French and Cumberland Bays there appeared to be no landing place.

Cumberland Bay lies exposed to northerly winds, and in the months when these winds prevail no ship should anchor in it; it curves in from the heads which form

the bay upwards of a mile. The western head, which divides Cumberland from English Bay, is a precipice upwards of 200 feet high ; the face of it is a deep brown colour, and the eastern head has the same appearance with regard to its formation.

In coming from the eastward, the barracks at fort San Juan Bautista, and the village below it, near the beach, can be seen when abreast of the eastern head. At the back of the village the ground rises rapidly to the hills farther inland, and on each side of it is a valley. The valley on the western side runs several miles back, rising rapidly to the mountains in the centre of the island ; in front of the village (on the western part of Cumberland Bay) is a piece of ground of several acres, which has been chiefly formed by the soil washed down by the rains from the high land. This was in a state of cultivation, but chiefly planted with potatoes and cabbages ; other kinds of vegetables were also planted, but did not thrive ; they are mostly destroyed when young by worms, of which there are immense numbers. There is a fine stream of water running down the valley to the westward of the village, and is brought to the mole, or landing place, by a small trough. The sea was perfectly smooth when we were here, in all parts of the bay. I was informed by the people on the island that it is always so, excepting in the season of the northers, so that a boat could haul close inside the mole, and with a hose fill the casks without landing. The strand at the bottom of the bay extends to the eastward, about three-quarters of a mile, to a high cliff. Half a mile from the beach, up the valley which is to the eastward of the village, are a few miserable huts, in which some prisoners reside. Each hut has a patch of ground allotted to it for raising what vegetables they can, on their own account.

On the East side of the bay is a small valley : there is said to be a fine stream of water running down it, but it cannot be so handy to fill the casks from as the stream at the mole.

With regard to supplies, we found that poultry is scarce ; sheep are very good, and are four dollars each. The price of a bullock is about fourteen dollars ; those we saw were in very good condition : there is also a quantity of goats on the island. Vegetables are scarce and dear. Part of the cattle is private property, and before purchases can be made, the governor's permission must be had. Piles of wood are cut, ready for sale, in different parts of the bay, to be purchased from the governor. The expenses incurred by touching here for wood and water are trifling, as the islanders are very anxious that ships should stop here for supplies. They have two large boats, in which the prisoners are occasionally sent out to fish. A few seals are caught sometimes. The boats are generally successful in fishing, and also take very fine lobsters. Among the fish which abound here, are excellent rock cod, a number of which I saw on shore salted down. There is very little game on the Island of Juan Fernandez, with the exception of pigeons, which are numerous, and fly in large flocks, many of which are domesticated.

We filled up our stock of water, and should have had our firewood and other supplies on board the next day, but during the night a violent south-wester set in ; heavy squalls came down the valleys, which started our anchor and drove us to sea. In the morning it moderated ; we made several tacks, endeavouring to

recover the anchorage, but as the wind was baffling, we lost ground on each board; and finding it would be too much sacrifice of time, we bore up for Mazatlan, where we were bound.

The climate of Juan Fernandez is mild, and is considered healthy, but the weather is very changeable. The mornings are generally cloudy, with showers of rain. Towards noon the weather clears up; the afternoons are clear and pleasant; towards midnight the clouds begin to gather on the high lands, which spread over the island; squalls come down the valleys, and showers of rain, which again clear up as the day advances. This is said to be the general state of the weather for eight or nine months of the year.

English Bay, although not so well sheltered, has a better appearance from the sea than Cumberland Bay. The ground about it is not so much broken, and rises with a more gentle ascent towards the high land. It was in this valley, which runs up from the bottom of the bay, that the celebrated Alexander Selkirk is said to have lived. There are a few huts some distance from the beach, in which the prisoners reside who are at work there. Whilst we were here, a party of about thirty prisoners arrived from the S.W. part of the island for provisions; and the allowance for three weeks issued to them appeared to me to be a very scanty supply. It seems that these were the worst characters on the island, and were kept farthest from head-quarters. Each party has a prisoner appointed as overseer, who keeps them pretty close at work, in clearing ground for cultivation, cutting wood, making roads, &c. The convicts of Juan Fernandez are mostly assassins, and amongst them are several women.

The Spaniards, when they had possession of the island, must have spared no expense in improving this place. They constructed a paved road from the beach to their largest fort, which is up the western valley about a mile. The road is now broken up, and the fort in ruins. Besides this, they had another commanding the bay, behind the fort of San Juan Bautista. After the revolution had gained ground in South America, the establishment was broken up, and everything destroyed; the forests were set on fire, and, particularly where sandal-wood grew, care was taken to keep them burning. This is a grave accusation, and savours much of the narrow-minded jealousy of by-gone ages; but they are even said to have destroyed large timber, where it was easy of access. The only things that remain are two guns at Fort San Juan Bautista, one of which is useless; the other, although mounted, is nearly as liable to damage those who fire it, as those fired at. There had been a number of wild goats on the island, but these suffered the common lot, and were all destroyed.

We found a small quantity of sandal-wood in store for sale, at six dollars per quintal, but it was only the roots of trees which were formerly growing, the whole of them being more or less burnt. I learnt from the commandant that there were parts of the island, towards its centre, which most probably had never been visited, where sandal wood might still be growing. A prisoner, who had a very decent appearance, informed me, that in his rambles he had seen some beautiful little plains in the centre of the island, but as there were no roads, it was difficult to get into them. On the sides of the mountains there is a great quantity of very fine timber; but the highest part of Juan Fernandez is inaccessible, and

several prisoners have lost their lives in attempting to reach the summit. A reward was offered for the performance of this feat, besides the liberty of the person who succeeded; but this is now suspended.*

When H.M.S. *Collingwood* came here, in 1845, a single Chilian family constituted the whole of the resident population, who claimed the largest and readiest stream for watering. Cabbage, palms, cherry trees, and peaches, were found to be abundant. All these, with wild oats, radishes, nasturtions, rhubarb, and strawberries, grew in wild and useless fruitfulness, for since the removal of the Chilian garrison and convicts, the remains of whose occupation were still evident, no permanent colony has been established here. Animals are abundant for such a small spot; goats were plentiful, and were seen grazing on every height. Goat or Sta. Clara Island was full of them, and are here more easily taken. If the hunting party be numerous, they may be taken alive—a practice much in vogue among the whalers who visit the island. Mint and thyme may be procured in abundance, to render their meat more palatable. Many horses run wild; also asses, which have attained great size, and roam in fierce and wild herds. Dogs are said to be numerous and troublesome. Cats, like the dogs, introduced to kill the goats, now live among the rocks, and catch fish, and allow rats to roam with impunity. Seals are nearly extirpated, but fish and crayfish are in undiminished abundance.†

SANTA CLARA or GOAT ISLAND, to the S.W. of Juan Fernandez, is thus described by Mr. Bennett, in his whaling voyage:—It does not exceed 4 or 5 miles in circumference, and is of moderate elevation. Its summit is surrounded by many conical eminences or hummocks. Its western extremity is bluff, whilst the eastern descends gradually to the water's edge. Its shores are precipitous, and chiefly composed of a brown volcanic stone, presenting on the faces of many of the cliffs tortuous columnar projections, resembling the trunks and branches of trees embedded in its structure. This islet has a burnt and desolate aspect, and affords no vegetation higher than a stunted shrub; whilst the few verdant patches of soil tend rather to heighten by contrast, than to relieve, the general sterility of its appearance. On the North side, and towards the western extremity, a run of fresh water empties itself into the sea over the face of the cliffs. Landing is effected with difficulty, and fish is very abundant.

MASAFUERA, the second island of the Juan Fernandez group, is in lat. 33° 49' S., and lon. 80° 56' 30" W. Capt. Masters says it is stated to be more capable of cultivation than Juan Fernandez, and that a greater number of seals frequent it; there was at the time of his visit, in 1835, ten or twelve persons on it, free settlers from Chile; and the crop of potatoes in that year was 800 bushels, besides other vegetables. It appears that there is a place where a boat can land on it with safety. Fresh water is good and plentiful, but there is no anchorage off any part of the island. It is estimated to be about 2,300 feet high.

* Nautical Magazine, June, 1837, pp. 359—361.

† Four Years in the Pacific, by the Hon. F. Walpole, 1849, pp. 367-8.

ST. AMBROSE AND ST. FELIX.

These two islands, or groups, lie off Copiapo, in Chile, and are only visited for the purposes of fishing or procuring water from St. Ambrose ; but the difficulty of finding secure shelter diminishes their value. In former years immense herds of seals frequented their shores, but these have almost all disappeared ; their pursuit is no longer profitable.

ST. AMBROSE is the easternmost, and according to Morrell is about 5 miles in circumference. On the North side there is a snug little cove for a boat, and a good landing at all seasons of the year, with the wind blowing from any southerly point between East and West. But it is difficult to obtain fresh water from this landing. About the centre of the North side, however, there is still better landing, where fresh water of an excellent quality may be had in any quantity from a pond on the top of the island, and led down to the boats with a hose.*

Capt. H. W. Bruce, in H.M.S. *Imogene*, touched here in December, 1837. His remarks follow :—" Leaving Valparaiso, we kept a brisk trade wind from S.S.W. to S.E., with very fine weather, and in seventy-two hours were abreast of St. Ambrose Island, the wind S.S.E. to E.S.E. Finding a strong N.E. current, we made St. Ambrose, bearing S.W. by S. 15 miles, and hauled up to close it, passing it within 6 to 8 miles. A remarkable rock, very much resembling the ' Bass ' in the entrance of the Frith of Forth, lies off the East end of this island, and a small, rugged, conical-shaped rock to the eastward of it again. The large island (St. Ambrose) is, to appearance, about 3 miles from East to West, perhaps 4 miles to the conical rock extreme, from the West end of St. Ambrose, the Bass-like rock being almost connected with, and a small rough rock between it and St. Ambrose. Through the West part of the ' Bass ' is a remarkable fissure, leaving a cavity through at the water-line, and apparently 20 feet high, shaped as a triangle. Taking the height of the real ' Bass ' at 400 feet, that of the isle will be about 1,600, the two ' Besses ' being of a height. From these, keeping our course again, we passed close to the northward of the Isles of St. Felix, distant about 10 miles from the other, and grouped close together ; within 6 or 8 miles from this bearing, we could distinguish three ; five are represented in the chart. These islands all seem to be volcanic, and are without an appearance of verdure ; they are all, including the ' Bass,' much marked by the birds which frequent them, and are numerous. We observed boobies, Cape pigeons, and others unknown." Capt. Bruce makes the West point of St. Ambrose to be in lat. 26° 21' S., and lon. 7° 53' 30" W., of Fort St. Antonio, at Valparaiso, or 79° 35' 0" W.

ST. FELIX is about 4 or 5 leagues W.N.W. of St. Ambrose, and is about the same size. On its West and S.W. sides it shows steep and perpendicular cliffs, but there is a place for landing on the N.W. side, about one-fourth of a mile eastward of the N.W. head or bluff. Here, in a sort of gully, you may land on a flat rock at all seasons of the year ; but on the beaches at the North and East sides of the island the landing is dangerous, as the shores are steep. This is according to Morrell. Capt. Colnett's people landed on the North side of

* Narrative of Four Voyages, by B. Morrell, p. 117 ; but see note p. 70, *ante*.

it with great risk and difficulty, and traversed the island, which produces nothing but a plant resembling the common nettle, of a salt taste, and disagreeable odour. They could find no fresh water, and the soil was mere sand, from one to six inches deep, on a solid rock, and furrowed by heavy rains. No living thing, except flies, was seen; but great numbers of addled eggs. Of the danger in getting away there was good proof, as Colnett's people were upset several times, and one of his best seamen was killed by the boat falling on him.

Capt. Bruce says:—One of the St. Felix Isles is low and long, about 2 miles in extent, having a peaked hill at its West end. The East hill is high and sugar-loaf shaped, and the westernmost is a jagged and very peculiar looking rock. The surf beats heavily against every one of them, even on their lee sides, though the water with us was smooth; and nothing like a possibility of landing could be entertained from our view of them. Colnett says:—When South of the western isle (*St. Felix*) the whole has the appearance of a double-headed shot; but the easternmost hummock is separated from it by a very narrow reef, which divides it, as it were, into two isles; the lowest land commencing with the reef, and joining the hummock to the West. There is also a remarkable small rock off the N.W. end, which, in most points of view, shows itself like a ship under sail.

St. Felix certainly affords the means of sustaining human life, for Capt. Morrell, in August, 1823, found on it five sailors, who had been inhumanely deserted by a sealing vessel three months previously. They had latterly lived on raw fish and sun-dried seals' and birds' flesh.

The position of St. Felix, according to the observations of Malespina, May 10, 1793, is lat. 26° 20' 15" S., and lon., from Coquimbo, 79° 49' W.*

A REEF is placed on M. Vincendon-Dumoulin's chart of the Pacific, in lat. 26° 20' S., lon. 94° 35' W. This position is marked as doubtful.

A REEF is marked as doubtful on M. Vincendon-Dumoulin's chart, in lat. 32° 0' S., lon. 95° 15' W.

The ISLAND of SALA-Y-GOMEZ was discovered in 1793, by the Spanish commander of that name. It was again visited by the Spaniards in 1805. An American, named Gwyn, discovered, in 1802, a rocky island on the same parallel, but 5° to the West; but it is probable that it is the island in question, for in Kotzebue's search for it he found only that discovered by Capt. Gomez, consequently the Gwyn Rock is no longer placed on the charts. Capt. Beechey examined it, and found Kotzebue's latitude 9 miles in error, probably a typographical mistake. It is an isolated spot, of less extent than had been stated, being scarcely more than a heap of rugged stones, apparently thrown together by the elements, and in a gale of wind would not be distinguishable amidst the spray. The rocks, except such parts as have been selected as roosting places by the sea-gulls, are of a dark-brown colour. Upon a small flat spot there was a moss-like vegetation, and near it a few logs of wood, also noticed by Sala-y-Gomez.

* See Voyage of Colnett, pp. 34—37; Nautical Magazine, September, 1838, pp. 581—583; and Morrell, as above.

"When first seen the island has the appearance of three rocks. (It was seen at daylight 15 miles off, bearing N.N.W.) Its direction is N.W. and S.E., and is something less than half a mile in length, and a fifth of a mile in width. Some sunken rocks lie off the N.E. and S.E. points; in other directions the island may be approached within a quarter of a mile. N. 50° W., three-quarters of a mile, there are soundings, in 46 fathoms, sand and coral; and N. 33° W. 1½ miles, 140 fathoms, gray sand."* The S.E. extreme is in lat. 26° 27' 46", lon. 105° 20' 8"; variation, 8¼° E.

TEAPY, WAIHU,† or EASTER ISLAND.—This island, which has been the subject of much observation, from the fact of a race of people having disappeared, perhaps in the interval elapsed since it was first described, was discovered by Roggewein, in 1721.‡ Cook and La Pérouse both visited it, and gave great interest to it from their descriptions. Other and later navigators have since frequently touched here. Some island was discovered by an Englishman named Davis, who thence called it *Davis's Land*; and Krusenstern endeavoured to prove that it was not Easter Island;§ but the position he assigned, between lon. 90° and 95°, was sought over by Kotzebue without success. They must therefore be considered as identical. Capt. Beechey says that Easter Island, bearing W. by N., at first had the appearance of being divided into two, rather flat at the top, with rounded capes; the N.E. of which is distinguished by two hillocks. On a nearer approach, numerous small craters are observed rising above the low land, and, near the N.E. extremity, one of considerable extent, with a deep chasm in its eastern side. None of them had for a long time been in action.

The island is of triangular shape; its length is exactly 9 miles from N.W. to S.E., 9½ miles from W.N.W. to E.S.E., and 13 miles from N.E. to S.W. The highest part is the N.E. peak, 1,323 feet high, and in clear weather it may be seen at 16 or 18 leagues' distance.||

This island is 2,030 miles from the coast of Chili, and 1,500 from the nearest inhabited island, except Pitcairn Island. This island has been but seldom visited, and it is feared that these few visits have not tended to improve the people, for Beechey and Kotzebue nearly or quite came to open rupture with them. La Pérouse planted many useful fruit trees and vegetables on the island, with what success is not known.

One very singular feature of the island is the gigantic busts or idols which Roggewein, Cook, and La Pérouse describe; but these, either from neglect or injury, have nearly or quite disappeared; a few heaps of rubbish only remain in

* Beechey, vol. i. pp. 28-9.

† WAIHU, or WAIHOU. This name is applied to Easter Island by Kotzebue (vol. iii. p. 224, English translation); but on several charts, as on that by Admiral Duperry, there is a Waihou Island placed in lat. 22° 15' S., lon. 109° 1' W.; that is, *five degrees* to the northward of Easter Island. This is probably an error. Capt. Worth, in H.M.S. *Calypso*, passed near the spot stated in February, 1848, but makes no mention of any island here which confirms the above remarks. —E.

‡ See Dalrymple's Collection, vol. ii.

§ Ephemerides Geographiques, tome xvii.; also Burney, in his Account of the Buccaneers; and Beechey, Voyage of the *Blossom*, vol. i. p. 29.

|| Beechey, vol. i. In the Narrative of La Pérouse's Voyage, tome iv. p. 21, *et seq.*, there is a detailed account of the island, and its appearances on approaching it, by M. Bernizet, but it would not be intelligible without the plates.

many places. Whether this is the effect of native migration or volcanic convulsion cannot now be well known.

Off the South Point lie two rocky islets, one nearest the point high and peaked, the other low and flattish. Cook anchored (March 14, 1774) in a small open bay, off this West side of the island. His station was about a mile from the nearest shore, the South point of a small bay, in the bottom of which is a sandy beach, bearing E.S.E. $1\frac{1}{2}$ miles distant; the two rocky islets were here just shut behind a point to the North of them; they bore S. $\frac{3}{4}$ W. 4 miles distant, and the other extreme of the island bore N. 25° E., distant about 6 miles. But the best mark is the sandy beach, because it is the only one on this side of the island. Toward the East end of the island there were great numbers of the gigantic statues, and here they found a well of fresh water, but the water procured at the anchorage was salt and useless.—(Second Voyage, vol. i. p. 287, *et seq.*)

Capt. Beechey made Pérouse Point in Cook's Bay to be in lat. 27° 8' 46", lon. 109° 24' 36".

(The *S.W. portion of the Low Archipelago*, which may be considered as commencing at Ducies' Island next to the westward, is within our present limits of lat. 20° S., but will be described altogether in a succeeding chapter.)

DOUGHERTY ISLAND.—This island, which must be one of the most isolated spots in the ocean, being in the most open space of the great world of waters, was discovered by a whale ship, the *James Stewart*, Capt. Dougherty, on May 29th, 1841. It ought to have taken its place on a former page, but is unconnected with any other known system. It appeared to be an island 5 or 6 miles in length, running N.E. and S.W., with a high round bluff on the N.E. end, with low land to the S.W.; between the N.E. and S.W. ends there appeared a valley covered with ice and snow. He passed it within a quarter of a mile, going at least 10 knots. The position was only gained approximatively on account of not having proper observations for several preceding and following days. Lat. 59° 20' S., lon. 120° 20' W.*

OPARO or RAPA ISLAND.—Oparo was discovered by Vancouver, December 22, 1791. At first it bore N.E. $\frac{1}{2}$ N., and then appeared as three small islands, the easternmost much resembling a vessel under sail. They did not land, but saw nearly round it; they considered that anchorage might probably be found on both sides of its N.W. point. To the southward of that point is a small bay with a stony beach, through which there was the appearance of a considerable stream of water falling into the sea. The shores in most parts were so perfectly smooth, that landing might have been effected without the least difficulty. Round to the North of that point is another small bay, in which are a small islet and some rocks; behind these, the shore may be approached with great ease at any time. Indeed, there was not any part of the island which appeared to have been acted upon by heavy violent surfs, as the verdure in many places reached to the water's edge. The South extremity of the island appeared in some points of view to

* See Courier, St. John's, New Brunswick, August 21, 1841.

form a right angle without the least interruption in the sides; about half a mile to the S.E. is a small detached islet; the shores are interspersed with sandy beaches; its greatest extent, which is in a N. 18° W. and S. 18° E. direction, is about $6\frac{1}{2}$ miles, and it may possibly be about 18 miles in circuit.

Its principal character is a cluster of high craggy mountains, forming, in several places, most remarkable pinnacles, with perpendicular cliffs nearly from their summits to the sea. The valleys, or rather chasms, between the mountains, were chiefly clothed with shrubs and dwarf trees. Neither plantains nor other tropical plants appeared; neither fertility nor cultivation were evident.

The natives, who appeared not to have seen Europeans before, resembled other of the great Polynesian nations. They were estimated to amount to above 1,500 at least. On the tops of six of the highest hills some native fortifications were observed.*

Capt. Bellingshausen places it in lat. $27^{\circ} 37' 40''$, and lon. $144^{\circ} 16' W$.

NIELSON REEF.—On January 19, 1827, the ship *Sir George Osborne* passed between two portions of this reef, on which the sea broke in places, being nearly level with the water. White coral was observed under the ship, from 4 to 6 fathoms; the reef extended a considerable distance, curving S.E. in the form of a crescent, as far as the eye could reach from the mast-head. The sea being perfectly smooth, showed itself by breakers, only occasionally breaking. Its situation was lat. $27^{\circ} 0' S.$, lon. $146^{\circ} 16' 45'' W.$ by chronometer. This information was given to the world by Mr. S. Stutchbury, the naturalist, on board the *Sir George Osborne*.

In 1831 the ship *Lancaster* struck on it; the weather was also fine, and the sea did not break. The least depth found was 12 feet.†

Besides the name of *Nielson Reef*, given to it after the captain, it is also called *Osborne Reef*, after his ship, and *Lancaster Reef*, after the second occurrence.

BASS ISLES.—To the E.S.E. of Oparo are four small islands, discovered by Mr. Bass, well known as the gentleman who first passed through the strait separating Van Diemen's Land and Australia. They have been marked as the Coronados, or Four Crowns, discovered by Quiros, but there is nothing but their number to support this supposition. Krusenstern argues that these last are identical with the Gloucester Isles, 7° farther North.‡ M. Vincendon-Dumoulin places them in lat. $28^{\circ} 5' S.$, lon. $142^{\circ} 45' W.$

TOUBOUAI OR AUSTRAL ISLANDS.

This is a dispersed group, lying to the southward of the Society Islands and the Low Archipelago. The first of these appellations is given to them in the charts by M. Vincendon-Dumoulin. The second is applied by Mr. Williams in his *Missionary Enterprises*. The islands composing the group have not been much frequented or visited, as they are small, and do not offer many inducements for the calls of passing navigators.

* Vancouver, vol. i. pp. 75-6.

† Nautical Magazine, 1833, p. 693.

‡ Krusenstern, Mem. Hydr., vol. i. pp. 28-9.

VAVITAO is a small high island, discovered, October 23, 1791, by Capt. Broughton, who places it in lat. 23° 42' S., and lon. 147° 11' E. He did not apply any name to it, believing it to be the same as Toubouai, but Mr. Bass states that its name is Vavitao.

M. Mauruc gives the particulars of an island which he calls *Hig* (*High?*) *Island*, in lat. 23° 40', lon. 148° 0' W., the native name for it being *Ravaivai*, which must be the same. He says it is high and surrounded by reefs. There is a well-sheltered harbour in its N.W. part to the West. The people are very mild in their disposition. No provisions can be got. The current here is always so strong that it cannot be outrun in light breezes.*

A REEF lies in lat. 24° 45' S., and lon. 148° 20' W. to the S.W. of Vavitao, according to Commander Hamond, H.M.S. *Salamander*.†

TOUBOUAI is the next island to the westward, and is much smaller than Vavitao, being not more than 5 miles in extent. Krusenstern places it in lat. 23° 25' S., lon. 149° 23' E. On making it from the northward it appears like two islands, but the two hills join at the base; steer for the ridge between the two hills, and it leads to the passage through the reefs to the anchorage inside. The harbour inside the reefs is unsafe, fit only for small vessels, and the anchorage outside is insecure and rocky, with bad holding ground. A reef extends a full mile off the S.W. point. The French protectorate flag was flying on it in January, 1848.

OHETEROAH, discovered by Capt. Cook in his first voyage, August 14, 1769, is about 13 miles in circuit, and rather high than low, but neither populous nor fertile in proportion to the other islands he had seen. It is not surrounded, like the neighbouring islands, with a reef. Cook's boat landed on the West side of the island, in a bay the bottom of which was foul and rocky, but the water exceedingly clear. His position of it is lat. 22° 27' S., lon. 150° 47' W. (150° 13' corrected).‡ M. Mauruc calls it *Rouroutoua*, and says there are some harbours for small ships, the population numerous and inoffensive; the same productions as the preceding.

A GROUP of ISLANDS is placed by M. Vincendon-Dumoulin in lat. 21° 50', lon. 150° 0' W., apparently of coral; and on Mr. Purdy's chart there is another island, in lat. 21° 20', lon. 149° 20' W.

RIMITERA was discovered by Capt. Henry, and is in about lat. 22° 40' S., and lon. 152° 20' W. It is highest in the centre, which is about 300 feet, being, according to M. Mauruc, rather lower than its neighbours. It has no harbour, but has the same provisions, which he procured at a very easy rate.§

SANDS ISLANDS, a group of four small islands, contained in a circumference of about 10 miles, with very high breakers clear round them; the height of the land (trees?) is not more than 30 feet. They bear from Rimitera about W.N.W. $\frac{1}{4}$ W.

* Nautical Magazine, July, 1847, p. 379.

† Bulletin de la Société de Géographie, 1848, p. 95.

‡ Voyages made by order of George III. (Hawkesworth's Collection), vol. II. p. 276. When Cook was here he was informed of the existence of Manuo and Mouton. The longitudes of Cook in the Low Archipelago differing from Beechey by 34', this would be in 150° 13'.

§ Bulletin de la Société de Géographie, 1848, p. 96.

They were discovered by Mr. J. R. Sands, master of the *Benjamin Tucker* whaler, October 19th, 1845. They lie in lat. $21^{\circ} 50' S.$, lon. $154^{\circ} 0' W.$ *

A *small island* is marked on Arrowsmith's chart, about a degree to the West. Capt. D. Bethune also mentions that an island exists about 150 miles East of Mangaia. This must be the island in question, but it may be the same as Sands Island.†

COOK'S ISLANDS.

This group of islands, which lie scattered over a considerable space, without any intimate connexion between each other, were so collectively designated by Admiral Krusenstern, in the first volume of his invaluable *Memoires Hydrographiques*. It consists of nine or ten separate islands, the greater part of which were discovered by Cook; hence the appropriateness of their collective appellation. The progress of Christianity in them occupies a considerable portion of the interesting Missionary Enterprises, by the late Rev. John Williams, who, with some other authors, called them the HERVEY ISLES,‡ the name of one of the groups.

MANGAIA (or Mangea) is the south-easternmost of the group. It was discovered by Capt. Cook, March 30th, 1777, in his third voyage. He places it in lat. $21^{\circ} 57' S.$, lon. $158^{\circ} 7' W.$ The following recent account of it, by M. Dutailis, will also give an idea of the rest of the group.

This island is high enough to be distinguished at 25 or 30 miles' distance. It is very irregular. Its shores are abrupt, and do not present, like those of Tahiti, the smiling valleys winding in planes inclined towards the sea. It is of volcanic origin, and is about 30 miles in circumference. The coast is not defended, as usual, by a reef; the sea beats nearly direct upon its flanks; and a mass of coral attached to it, but not extending more than 15 or 20 yards out, serves as a breakwater and shelter to it.

There is not any opening; it consequently has neither port nor road. The sea around it is of great depth, and without any danger.

The only communication with the land is made by means of canoes, which alone are capable of clearing the narrow line of heavy surf separating the shore from the ocean, which is done at high water, and seizing the most favourable instant.

The principal village, *Oneroha*, lies on the North side of the island; and it is to this part that ships desiring to trade with the natives ought to come. With the usual winds it is preferable to make it to the South, for the currents bear to the North.

It contains about 2,000 inhabitants, being about one-half the entire population. It was entirely destroyed in March, 1846, by a storm, which devastated the whole island. Nearly all the native houses were blown down, and the church, which

* Whalers' Shipping List, New Bedford, United States, March 10th, 1846; and Shipping Gazette, March 18th, 1847. They are placed by M. Vincendon-Dumoulin in lat. $21^{\circ} 50' S.$, and lon. $115^{\circ} 4' W.$, as was given in the newspapers above; but the bearing from Rimetara, &c., shows that lon. 154° is meant.—Ed.

† Nautical Magazine, October, 1840, p. 685.

‡ They are so called in the Asiatic Journal, February, 1827.

they had just constructed, was destroyed. The fruit trees were overturned, and the consequences of this disaster were so great, that a famine ensued.

In 1848 a part of these houses had been rebuilt, plastered with lime, and well whitened. They presented an appearance of comfort and cleanliness seldom found in the islands of the Pacific.

The productions of the island are numerous and cheap. They consist of figs, turkeys, fowls, ducks, yams, sweet potatoes, pine-apples, which the inhabitants obtain, in spite of the poverty of the soil, by assiduous labour and care but little common to these islanders. The exchange is by means of money, printed calico, &c. The purchases are made on shore, in a spot destined for the purpose; and the transactions are made so quickly and so justly, that they deserve special mention.

The three villages composing the people of the island are united under the authority of the same chief or king. He has under him six smaller chiefs, or governors. There is a police, for protection, &c.

The stranger, on his reaching the shore, is received by a constable, who accompanies him, and does not leave until his business is ended. If he wishes to make any purchases, the policeman announces it to the vendors, and in an instant all the goods are brought to one common spot. A tariff, affixed to a post, shows the extreme limits of the prices of the articles, which must not be exceeded, and between which the price varies according to circumstances.

By the intervention of the policeman, according as you pass before each seller he fixes his price; if you consider it too high, you refuse, and say your own, which, if he thinks is not enough, and will not come down to, he gets up and carries away his goods. When, on the contrary, the sale is concluded, the money is paid by the purchaser into the hands of the constable, who gives it himself into the hands of the seller, after having assured himself that it is the exact price of the agreement. In this manner any objection to the payment becomes impossible. Having walked through the market, all the Indians whose prices appeared too high are excluded, and only those remain to deal with who have shown any hesitation on this. Everything is then quickly settled.

The young missionary, Mr. Gill, who directs them, seems to exercise a great influence over them, of which he takes advantage in exerting them to labour.*

RAROTONGA is a beautiful island seen in the *Seringapatam*, in 1814. Mr. Williams, the missionary, says that he discovered it in 1823. It was also seen by Capt. Dibbs, in the schooner *Endeavour*. It is a mass of mountains, which are high, and present a remarkably romantic appearance. It has several good boat harbours, but no anchorage; it is about 30 miles in circumference, and surrounded by a reef.†

The following, by *M. Dutailis*, is more recent and explicit:—

This island appears to be of the same formation as Mangaia. Like it, it may be seen at a great distance, and only differs in that the surrounding reef is not

* *M. Dutailis*, *Annales Hydrographiques*, vol. i. pp. 145-6; see also *Cook's Third Voyage*, vol. i. p. 174, *et seq.*; and *Williams's Missionary Enterprises in the South Sea Islands*, p. 18.

† *Missionary Enterprises*, p. 18; Capt. D. Bethune, in *Nautical Magazine*, October, 1840, p. 685; Sir E. Belcher, vol. ii. p. 16.

quite continuous, but has in some points small openings, which afford harbours for small vessels, without shelter, and anchorage without holding ground.

The principal village, named *Avarua*, is in the North. The entrance to it, which affords communication with the sea, may be about 50 yards broad within the reef. Another, named *Ataia*, is in the S.E.; and the last, *Arognani*, in the N.W. *Ataia*, the most important after *Avarua*, is a bad harbour; and the recent loss of some coasting vessels offers little encouragement for others to follow them. That of *Arognani* is in still greater discredit.

The productions of this island, which is much more fertile than *Mangaia*, are exactly the same; and although frequent communication and the ties of relationship unite the inhabitants of these two islands, they but little resemble each other in respect of industry and intelligence.

The brother of Mr. Gill, of *Mangaia*, exercises the same functions at *Rarotonga*, but states with regret that he has not obtained the same good results.

The population does not exceed 4,000 inhabitants. It was ravaged by the tempest of March, 1846. The hurricane commenced about seven o'clock in the evening, then blowing from S.E.; it then passed successively to every point of the compass, overthrowing the houses, trees, the church, and in general everything that offered any obstacle to its force. It ceased at four o'clock in the morning. Like as at *Mangaia*, a terrible scarcity ensued.

Position of the centre of the island, according to M. Dutailis: lat. $21^{\circ} 13' S.$, lon. $160^{\circ} 6' 33'' W.$; var., $10^{\circ} E.$ The N.W. point is in lat. $21^{\circ} 11' 35'' S.$, lon. $159^{\circ} 47' W.$ *

RURUTU is probably the *Oruruti* of Capt. Henry, which is placed a degree farther South by him than the position given by Capt. Drinkwater Bethune. Lat. $20^{\circ} 20' S.$, lon. $160^{\circ} 0' E.$ It is about 4 miles long E. and W., and 1,300 feet in height.†

ATIU, or *WATEEO*, was first seen by Cook, March 31, 1777, and resembles *Mangaia* in appearance and extent. He describes the people and his friendly reception by the natives at great length. It is a mere bank of coral, 10 or 12 feet high, steep and rugged, except where there are small sandy beaches, at some clefts, where the ascent is gradual. Cook could not get any quantity of refreshments here. Lat. $19^{\circ} 58'$, lon. $158^{\circ} 6'$.

TAKUTEA is the *Wenooaette* (i.e., *Wenua-iti*, Little Island) of Cook, who discovered it. It is in lat. $19^{\circ} 51' S.$, lon. $158^{\circ} 23' W.$, about 3 or 4 leagues from *Atiu*, the inhabitants of which called it *Otakootaia*, and sometimes *Wenooaette*, or Little Island. It is not more than 3 miles in circuit; the beach,

* There are three names which have caused some confusion here, *Roxburgh Island*, *Armstrong Island*, and *Oruruti*.

ROXBURGH ISLAND is said to have been discovered, March 5, 1824, by Capt. White, in the *Medway*, who made it 20 miles in length, lat. $21^{\circ} 36' S.$, and lon. $200^{\circ} 42' E.$, but without any pretensions to accuracy. It is now considered that it is identified with *Rarotonga* (*Horsburgh*).

ARMSTRONG ISLAND, an American discovery, lat. $21^{\circ} 21' S.$, $198^{\circ} 56' E.$, is also most likely *Rarotonga*. Both these islands have been diligently sought for, without success, by many whalers and others, and are not known to the natives.—(M. Dutailis.)

ORURUTI, discovered by Capt. Henry, is not *Rarotonga*; but, according to Capt. Bethune, lies to the North of it.

† Nautical Magazine, October, 1840, p. 685.

without the reef, is composed of white corals and, above which the land does not rise above 6 or 7 feet, on which grow several clusters of cocoa palms and vast numbers of other trees. It is entirely destitute of water. It was then uninhabited, but some empty huts, &c., were seen.*

MITIERO, according to the account given by Capt. Dibbs, of the *Endeavour*, lies in lat. $20^{\circ} 1' S.$, lon. $157^{\circ} 34' W.$, at the distance of 25 miles from Atiu. It is a low island, having a large clump of trees in its centre; it is from 3 to 4 miles from North to South, and a mile from East to West. Williams states, that from famine and invasion the population does not now exceed 100 persons.† Atiu, Takutea, and Mitiéro (or *Mittiario*), are connected together socially; the rest of the group are independent.

MAUKI, or PARRY ISLAND, is also a low island. It is about 2 miles in diameter, well wooded, and inhabited; but the soil does not appear in any part to exceed 40 feet above the sea level. It is situated in lat. $20^{\circ} 7' S.$, and lon. $157^{\circ} 11' W.$

In Arrowsmith's chart the island is termed *Parry's Island*, as laid down by Lord Byron in 1825, who calls it *Mauti*, as will be seen by the work of the late Mr. Williams, who claims also the discovery of Rarotonga, but which is designated on the chart as "Orurute," discovered by Capt. Henry. However it is well known by the native account that they had long before been visited frequently by whalers, and Capt. Henry did not touch at it until after Mr. Williams resided there.‡

At the time of the *Blonde's* visit the natives were exceedingly friendly, and were civilized by the missionaries. Cocoa-nut, pandanus, and bread-fruit, grew on it.§ Mr. Williams says that, prior to 1820, the population was considerable, but in that year an invasion and terrible massacre reduced the population to three hundred.

HERVEY ISLANDS were discovered by Cook in his second voyage, in 1773, and also seen by him in the third voyage, in 1777. They were named by him after Capt. Hervey, afterwards Earl of Bristol, one of the Lords of the Admiralty. This name has sometimes been extended to the whole group. Cook says that they consist of three islands, surrounded by a reef, which may be 6 leagues in circumference. The inhabitants call two of them, perhaps the largest, *Manuai* and *Auotu* (Bethune) or Ouitate. Mr. Williams says that there is no entrance into the reef, and that the desolating wars among themselves had reduced their number to a dozen people in 1830. Lat. $19^{\circ} 18' S.$, lon. $158^{\circ} 54' W.$

AITUTAKI (or *Whytootaké*) is the northernmost of this group. It was discovered, April 11, 1798, by Capt. Bligh, in the *Bounty*, a few days before the mutiny. When he made it to the S.S.W., 5 leagues distant, it appeared of moderate height, with a round hill on the North part; the N.W. part was highest and steep; the S.E. sloped off to a low point. It has a most fruitful appearance, its shores being bordered by flat land, on which grew innumerable cocoa-nut and

* Cook, Third Voyage, vol. i. p. 206.

† Journal des Voyages, vol. xxviii; Missionary Enterprises, p. 17.

‡ Belcher, Voyage of the *Sulphur*, vol. ii. p. 14.

§ Voyage of the *Blonde*, p. 308.

other trees, and the higher grounds beautifully interspersed with lawns. Capt. Bligh says it is 10 miles, Williams says 18 miles, in circuit. The latter also says it is hilly rather than mountainous, and surrounded by a reef, which extends a very considerable distance from the shore. There is a good entrance for a boat on the West side of the island. Its population is 2,000. Bligh's observations place it between lats. $18^{\circ} 50'$ and $18^{\circ} 54'$ S., lon. $159^{\circ} 41'$.

A group of small islands, or keys, eight in number, and covered with trees, lie to the S.E. 4 or 5 miles from Aitutaki, and a single one to the W.S.W. The southernmost of the group is in lat. $18^{\circ} 58'$ S. Variation, $8^{\circ} 14'$ E.*

Besides the above, which it is believed constitute the whole of the group, Cook mentions another which he calls *Mahowarah*, which is probably Mitiaro, or Mauki.

NEW ISLAND.—According to *M. Dutailis*, this island, which from private interests would remain unknown, lies, it is said, in lat. $24^{\circ} 20'$ S. and lon. $159^{\circ} 30'$ W. It is low, and offers a very advantageous trade in hogs. It will be important to ascertain the position and confirm the account of this island. In addition to the position above given, Commander Hamond, H.M.S. *Salamander*, states that an island exists in lat. $24^{\circ} 0'$ S., lon. $159^{\circ} 10'$ W. This must be the same.†

Another ISLAND is placed in lat. $22^{\circ} 30'$ S., lon. $162^{\circ} 51'$ E., by Commander Hamond.

BEVERIDGE REEF, a very dangerous shoal, first announced in the Nautical Magazine, August, 1833, p. 442. It is also the same reef called *King George Reef*, and *Middleton Reef*, in Norie's and Arrowsmith's charts. It is probable that the Nicholson Shoal, stated to be in lat. $20^{\circ} 5'$, and lon. $168^{\circ} 40'$, is the same, as Sir Edward Belcher sailed with the *Starling* 100 miles to the West of Beveridge Reef.

According to the original notice, no part of it appears above water, but the sea breaks over it in many places. On the inside of the reef there appeared to be deep water. Its extent is about 10 miles North and South, and about 8 miles East and West. On the West side, near the S.W. point, there appeared to be an opening. The position first assigned agrees exactly with that obtained by Sir Edward Belcher. By this latter it is called *Lagoon Reef*, and his account is as follows :—

“By our survey it appears that this reef occupies an outline similar to that of a coral island, having an entrance to the N.W. All the mass of shoal water appeared to be contracted at its S.W. extremity, but no rocks above water could

* Voyage of the *Bounty*, pp. 146—148.

† Annales Hydrographiques, 1849, vol. i. pp. 147-8; and Nautical Magazine, October, 1847, p. 379.

TUANAHU (?) is also an island announced as doubtful by Comm. Hamond, in lat. $26^{\circ} 30'$ S., lon. $160^{\circ} 25'$ W.

be traced. The S.W. extremity was determined to be in lat. $20^{\circ} 2' N.$, lon. $167^{\circ} 49' W.$, which differs from that assigned to the shoal seen by Capt. Nicholson. We termed it Lagoon Reef."*

TONGA OR FRIENDLY ISLANDS.

The merit of the discovery of these islands is due to Tasman, who first saw them, January 20th, 1643. He anchored on the N.W. side of Tonga-tabu, to which he gave the name of Amsterdam, as he imposed those of Middelburg and Rotterdam to Eoa and Namuka.† The recollection of his friendly relations with the natives still remained when Cook visited it during his third voyage, in 1777, when he stayed three months here (April to July).‡ Cook was the second navigator who saw them, in October, 1773, during his second voyage. In this voyage he anchored successively at Eoa and Tonga-tabu; on the following year he revisited this archipelago, and discovered most of the small islands to the North of Tonga-tabu, which now bear the distinct name of the Habaii or Hapai Islands.

In his third voyage, above alluded to, he stayed more particularly at Tonga-tabu, where he remained for thirty-six days, and maintained the most amicable relations with the inhabitants, which caused him to attach to them the appellation by which they were known; but we learn from the narrative of Mariner, and also from other sources, that these apparently friendly people, with Finow at their head, had planned an assault on the two ships, and a massacre of the whole crew; this was to take place at an entertainment, to which Cook and his officers were present; but the plot failed, from a misunderstanding of one of the chiefs. Cook unsuspectingly praised the entertainment as the best he had had at the "Friendly" Islands.§ This people also, we are told by D'Urville, had the same intentions toward D'Entrecasteaux and his ships.||

In February and March, 1781, the Spanish navigator, Maurelle, discovered Vavao and several of the neighbouring islands; but Cook, in his third voyage makes frequent mention of these islands, but did not see them. In the last days of 1787, La Pérouse saw these islands; but there is some doubt whether he remained any time here.¶ In the year following, Lieut. Bligh passed three days at Namuka; two days after which the mutiny of the *Bounty* took place.** In 1791 Capt. Edwards, in the *Pandora*, made two visits to these islands. In 1795 Admiral D'Entrecasteaux visited Tonga-tabu, and made some observations to establish its position, which coincide with those previously made by Cook. In 1795 an American vessel left six deserters here, *not* for the benefit of the natives. In April, 1797, the missionary ship *Duff* left ten missionaries, who at first established themselves at Hifo; but, from internal dissensions, they separated. It will be

* Sir E. Belcher, *Voyage of the Sulphur*, vol. ii. p. 54.

† Desbrosses, *Histoire des Navigations*, vol. i. 460.

‡ Cook's Third Voyage, vol. i. p. 95.

§ Cook's Third Voyage, vol. i. p. 282, *et seq.*; and Mariner's Account of the Tonga Islands, second edition, vol. ii. pp. 60-1.

|| Voyage de *L'Astrolabe*, vol. iv. p. 180.

¶ Voyage de la Pérouse, vol. i. p. 282, &c.; vol. iii. p. 244, &c.; Dillon, vol. i. p. 270, &c.; D'Urville, vol. iv. p. 181.

** Bligh, p. 209.

unnecessary to follow their career throughout; suffice it to say that three were massacred in 1799, five left by a ship, January, 1800, and the last left in 1801.

It is to the excellent work drawn up from the recital of William Mariner, by Dr. John Martin, that we owe the most complete knowledge we possess of the Tonga Islands. On the 29th of November, 1806, the English privateer, *Port-au-Prince*, mounting 24 guns and 8 carronades, and carrying 96 men, anchored before Lefouga, one of the Hapai Isles. On the morrow the ship was seized by the natives, and of the 62 men that then formed her crew, the captain and 36 of his companions were massacred. Of the 26 who were spared Mariner was of the number, and the chief, Finow, being much interested in the young man, took him into his own service; and during his residence of nearly four years among them, he observed the customs and manners of the natives, and from his observations gathered during this stay the narrative alluded to was drawn up. To the fidelity of this all who have visited the islands bear witness. Toward the end of 1810 a brig, the *Favorite*, of Port Jackson, engaged in the pearl fishing, appeared off Vavao, where Mariner was fishing. Capt. Fisk agreed to take him away, and all the other Europeans from the *Port-au-Prince* which could be collected. He thus left the Tonga Islands amid the deep regrets of the people who had been so kind to him. The work, which has been drawn up from his information by Dr. John Martin, is most interesting, and will give an excellent insight into the manners and thoughts of the fine and intelligent but treacherous people he had dwelt among.*

The Wesleyan Missionary Society established a mission here in August, 1822, which was well received by the chiefs.† This continued till the visit of D'Urville, in 1827.‡ M. Dillon came here three months afterwards, and learnt that the chiefs, true to their perfidious nature, had plotted to take his ship, and that a similar attempt had been made on the American ship *Supply* four or five years before; that the ship *Duke of Portland* was seized, and her crew massacred; and that several other vessels had been attacked, and lost several men of their crews, both at Hapai and Vavao.§ These facts are sufficient to prove the perfidious character of the natives, and to warn whoever may come into communication with them to be continually on their guard.

To enter into the details of the present social systems in the Tonga Archipelago would lead us into a long discussion, nor would it be interesting.

At the time of Wilkes's visit the people were separated into two parties, under separate kings or chiefs, who waged war on each other, and this in the name of Christianity. Perhaps this perversion of the spirit of peace was owing to the over-zealous proceedings of the missionaries.||

* Mariner's Account of the Natives of the Tonga Islands, &c., in 2 vols. second edition, 1818.

† Missionary Register, February, 1824, p. 79.

‡ William Singleton, an Englishman, who had resided on the island twenty-three years, was of the greatest service to D'Urville, when he visited here in the *Astrolabe*, in April, 1827. He was one of the unfortunate crew of the *Port-au-Prince*, and his adventures are related in the narrative of his shipmate, Mariner. D'Urville was enchanted to find him still alive, and speaks very highly in his praise. He was married, and had several children, and all his hopes were to end his days quietly at Tonga-tabu.—*Voyage de L'Astrolabe*, vol. iv. p. 24, &c.

§ Dillon, vol. i. pp. 254, 260, 274.

|| For a recent account of the group, see Capt. Sir Everard Home's paper in the Nautical Magazine, 1849-50.

The Tonga Archipelago is composed of at least one hundred islands and islets, comprised between 18° and 22° S. latitude, and 174° and 176° W. longitude. The three islands of Tonga-tabu, Vavao, and Eoa, are alone of any extent, which is from 15 to 20 miles in length. Seven others, namely, Late, Tofoua, Kao, Namuka, Lefouga, Eoa, and Haano, are from 5 to 7 miles in their greatest extent. The rest are much smaller. Many of them are only banks of sand or coral, covered with some tufts of trees. Tofoua, Kao, Late, and the two rocks of Hounga Hapai and Hounga Tonga, are sufficiently high to be distinguished at 15 or 20 leagues off at sea. Eoa, Namuka, and Vavao, are of a moderate height. Tonga-tabu, and all the rest, are very low.

Wilkes says the population of the Tonga Islands, as now given by the missionaries, is 18,500; namely, Eoa, 200; Hapai, 4,000; Vavao, 4,000; Keppel's Island, 1,000; Boscawen Island, 1,300; Tonga-tabu, 8,000. At present the number on Tonga is increased by about 1,000. About 4,500 of the natives are Christians; of whom 2,500 are church members. The group is divided into three missionary stations, Tonga-tabu, Hapai, and Vavao, at each of which missionaries reside.

"Respecting the character of the Tonga islanders, truth obliges me to declare an observation the reverse of that suggested by the New Zealanders. These generally improve upon acquaintance, and their better qualities are to be learnt, while the first impressions of them are repulsive, often barbarous and ferocious. It is entirely otherwise with the inhabitants of Tonga. In their first communications with Europeans they habitually place themselves in the most favourable light. Mild, polished, amiable, caressing, hospitable, they have almost always taken their first guests. We find that Tasman, Cook, Maurelle, and Wilson, successively testify in their favour. Deceived by the pleasing exterior, Cook named their land the Friendly Islands; but our experience, that of Labillardière, and Bligh, and, above all, the Narrative of Mariner, will show that they have the most hateful perfidy.

"Those who have carefully read the recital of this Englishman will be convinced that the Tongese unite in themselves the most opposite qualities. They are generous, complaisant, hospitable; and, at the same time, covetous, audacious, and, above all, profoundly deceitful. At the same moment that they are overwhelming you with caresses and friendship, they are ready to assault and rob you, for the trifle which their avidity or self-love are a sufficient stimulus."*—*D'Urville*.

A larger proportion of fine-looking people are seldom to be met with in any part of the globe than in Tonga. Their countenances are generally of the European cast; they are tall and well-made, and their muscles are well developed. The women are equally remarkable for their personal beauty. In their habits they are remarkably cleanly, and, from the practice of bathing every day, and sometimes more than once, renders them an excellent exception among many savage tribes. They have many excellent domestic qualities, and are very affectionate to the old and to young children. Their evil habits, which dim their better natures, it is to be feared, are derived from their more ferocious neighbours the Feejeans, as presently described.

* Voyage de *L'Astrolabe*, vol. iv. p. 231.

We have thus dwelt longer upon this interesting people, because, from their elevated moral and physical condition, they hold a very high place amongst the nations inhabiting the Polynesian Islands, and in this part their language and manners are often the standards to which those of other islands are referred. Thus in the Feejee group almost every island has two or more names, the indigenous one applied by the natives, and that given by the Tongese, as is exemplified in the name of the group itself, which is Viti, correctly. ¹

When D'Urville was here in May, 1827, by relinquishing the strict discipline of his crew, there was a disposition with some to desert and live on the island; this led to an eruption with the natives. They retained six of his men by force, which caused him to attack first Pangai Modou, and afterwards the celebrated and sacred Mafanga, which was most resolutely defended and fortified. However, after much cannonading, the men were given up, though not until almost all means had been exhausted. D'Urville's account of this island, and his proceedings, are interesting. See *Voyage de L'Astrolabe*, vol. iv. chap. 23. In the following chapter he gives an account of the island, its people, and its productions.

The intercourse between the Feejee and Tonga Islands has been much more frequent of late years than formerly. In Cook's time they knew little of each other. In Mariner's time the intercourse had become much greater, and the warlike Feejeeans had imparted their martial spirit to the more mild and peaceable Tongese. One of the first exploits of Mariner was his assisting in the siege and capture of the colo or fortress of Niopcalofa (Niukalofa), on Tonga, arising out of this marauding spirit. Among other barbarous habits they had also acquired was that of cannibalism; and some of the revolting details given by Mariner are counterparts of those given by Wilkes of the Feejeeans.*

The CLIMATE of Tonga is humid, and the heat oppressive, rising frequently to 98° in the shade; much rain falls; the mean temperature during Capt. Wilkes's stay was 79·25°. The trade winds are by no means constant, and westerly winds occasionally blow in every season, which, from their variable character, have obtained the name with the natives of "foolish winds."

The climate cannot be considered salubrious; very heavy dews fall at night, and no constitution can endure frequent exposure at this time; the transitions from heat to cold are sudden and great, and the nights are often so chilly as to make blankets necessary.

Hurricanes are frequent in this group, scarcely a season passing without some occurrence of the kind; the months of February and March are those in which they occur; but they have also taken place in November and December. The missionaries as yet have made no series of observations, nor kept any kind of meteorological diary; but, in answer to Capt. Wilkes's inquiries, he learnt that the storms begin at the N.W., thence veer to the eastward, and end at S.E. The wind continues to increase until it becomes a hurricane; houses are levelled, and trees torn up by the roots; vessels are driven on shore; canoes lost or driven hundreds of miles away to other islands. In these storms the wind is frequently

* See Mariner, vol. i. p. 90, *et seq.*, and p. 110.

observed to change almost immediately from one point to its opposite ; and in the same group of islands trees have fallen, during the same gale, some to the South, others to the North. They are local in their effects, and fall chiefly upon Hapai and Vavao ; if the fury of the storm be felt at Vavao, Tonga generally escapes, and *vice versa* ; but Hapai is more or less the sufferer in both cases, situated, as it is, between the two places. A very severe hurricane was felt at Lefouka Hapai in 1834. These hurricanes vary in duration from eighteen to thirty-six hours ; after a destructive one a famine generally ensues, in which numbers of the natives die ; it destroys all their crops. The natives give the name to those which are most severe, "Afa higa faji," or the hurricane which throws down the banana trees.*

These phenomena, which are those well known as attendant on *revolving* storms, will be readily explained by their means. For this the reader is referred to a subsequent part of this volume, and also to the Memoir on the North Atlantic Ocean, ninth edition, 1845, pp. 116—141.

WINDS from S.E. and E.S.E. prevail in the vicinity of Tonga-tabu, but in the months of February, March, and April, they frequently blow from W. and N.W., and often for several days together, accompanied by showers of rain and violent gusts. The very heavy swell from S.W., raised by the gales in high South latitudes, is almost continual, and keeps up a very strong surf on the southern coast of that island.†

EARTHQUAKES are rather frequent at the Tonga Isles ; for the first missionaries, in 1797, felt two or three shocks in the space of three months only. Without doubt these convulsions are connected with the eruptions of *Tofoua*, which is a volcano in continual activity.‡

Mosquitoes are exceedingly troublesome at times ; for three or four nights Wilkes's crew were almost overpowered by their intolerable annoyances ; the ship was so filled with them that she was (not inaptly) likened to a "musical box."§

Krusenstern arranges the Friendly Islands into the groups which are arranged around, or belonging to the principal islands, as Tonga-tabu, Annamooka (or Namuka), Hapai or Hapae, Kotoo, and Vavao. As there does not appear a more convenient arrangement than this, it will be followed here. Besides these more closely connected islands, there are two or three others which are not so much united to the entire groups.

PYLSTAART ISLAND, the southernmost, is one that does not belong to any particular group. Its name was given by Tasman, the discoverer. Freycinet places it in lat. 22° 24' 45" (between Cook and La Pérouse), and lon. 176° 4' W. It is about 700 feet high, covered with trees, cocoa-nuts among the number. It was called *Sola Island* by Maurelle.

DIBBS'S ISLAND, which is very low and dangerous, was discovered by Capt. Dibbs, who saw it just as his schooner was running on to it in the middle of the night. Its extent was not determined, but some bushes were seen just above the water level. It is from 5 to 7 miles N.E. of Pylstaart, and may be of recent formation, inasmuch as Cook did not see it.||

* Narrative of the United States' Exploring Expedition, vol. iii. p. 33.

† D'Urville, vol. iv. p. 225. ‡ *Ibid.* § Wilkes, vol. iii. p. 34. || Journal des Voyages, 1825.

ONO ISLANDS are a group of several small islands, the largest being 3 miles long and $1\frac{1}{2}$ miles broad. A chain of coral reefs, 7 miles long in a N.E. by N. and S.W. by S. direction, surrounds the group, the centre of which is in lat. $20^{\circ} 39' S.$, lon. $181^{\circ} 20' E.$ *

Ono, according to Capt. Worth, R.N., is a small but very productive island, the inhabitants being exceedingly well behaved and industrious, and having a great horror of cannibalism. Stock is very abundant, and easily procured by bartering articles of dress : indeed the natives will receive anything in exchange for their commodities. No anchorage is attainable at Ono, which is low, and is formed by a cluster of six islands enclosed within one reef, which forms a sort of lagoon, and contains about 400 inhabitants, all of whom are Christians, and of whom the missionary speaks in the highest terms. On the western side, at the distance of about 8 miles, there is a shoal.† This reef, which, according to Capt. Bellingshausen, is *ten* miles to the S.W. of the islands, he named *Bereghis Reef* (i. e., be careful), because he nearly lost his vessel on it.

MIKHÆLOFF and SIMONOFF ISLANDS are two small islands to the South of the Ono Isles, separated from each other by a channel $6\frac{1}{2}$ miles wide. The first, which is named after the artist attached to Bellingshausen's expedition, is $1\frac{1}{2}$ miles long by half a mile broad ; they are both surrounded by a reef at the distance of a mile, so that the circumference of each is $5\frac{1}{2}$ miles. *Simonoff*, from the name of the astronomer of the expedition, is in lat. $21^{\circ} 2' 50'' S.$, lon. $178^{\circ} 46' 20'' W.$

TONGA-TABU GROUP.

This is the principal and southernmost group, taking its name from the best known and largest of the islands.

EOOA, or Eoa, lies to the S.E. of Tonga-tabu ; a channel of 3 leagues broad separates them. Tasman called it MIDDELBURG. Cook saw it at 12 leagues' distance ; and the place where he anchored, on the N.W. part of the island, he called *English Road*, lat. $21^{\circ} 20' 30'' S.$, lon. $174^{\circ} 52' W.$ The island is about 10 leagues in circuit, and is about 600 feet high. It is rocky and barren, and contains only about 200 inhabitants.‡

Carrow, lat. $21^{\circ} 30'$, lon. $175^{\circ} 1'$, is off the South end of Eoa, 2 miles off. Cook passed between them.

TONGA-TABU is of the form of an irregular crescent, whose convexity faces the South, and the concavity the North, deeply indented by a lagoon of 5 miles broad and 3 miles deep. Immense reefs of coral extend 6 or 8 miles off the island on all its North part, and form different channels, with a useful road for any ship that anchors here. Many islets are disseminated on these corals, the greater part covered with trees. One of them, *Eoa-Tehi* (Eouaigee or Eoaajii), is placed on an isolated reef, and has a surface of a league in circuit. All the rest of the littoral of Tonga-tabu, from its eastern point round South to

* Capt. Bellingshausen, in *Krusenstern's Supplement*, p. 10.

† Capt. Worth, *H.M.S. Calypso*, July 12, 1848.

‡ Cook ; Wilkes, vol. iii. p. 7.

the western, is of a totally different aspect, and the belt of coral surrounding it rarely extends more than a cable's length off.

The island itself is nearly a dead level, with the exception of a few hillocks 30 or 40 feet high. Its highest point is 60 feet.* D'Urville says, that everywhere the soil is of prodigious fertility, whether for natural productions or for those cultivated by man. The missionaries found that it consisted of a rich soil, fifteen inches deep, free from stones, beneath which is a reddish earth, four or five inches, and then a bluish clay, more compact. In some parts there is a blackish mould, exhaling an agreeable odour of bergamot, which quickly evaporates in the air.† This extent of vegetable mould, which distinguishes it from other coral islands, gives a different character to its vegetation, which, in luxuriance of foliage, is not to be surpassed. Some pieces of pumice have been found on its shores, drifted there probably from the volcanic island of Tofoua.

Capt. Wilkes, referring to the fertility of Tonga-tabu, says :—" Although the vegetation equals any within the tropics, I was struck with the exaggerated accounts of the cultivation of the island ; so far from finding it a perfect garden, exhibiting the greatest care in its cultivation, it now appeared to be entirely neglected. The yam grounds are more in the interior of the island ; and, in consequence of the war, there was no safety in passing beyond the limits of the party possessing the North part of the island, or around Niukalofa. The natives cultivate yams, sweet potatoes, bananas, cocoa-nuts, bread-fruit, shaddock, limes, and the ti (*spondias dulcis*) ; the pandanus is much attended to, and is one of their most useful trees, and of it all their mats are made ; a little corn is grown, and they have the paparo, apple, and water-melon.‡

Fresh water is rare upon the surface of the island, and it is doubted if there is a rivulet, properly so called ; but, by digging to a trifling depth, drinkable water is generally obtained.

From the disordered state of society during the visits of later voyagers, it is difficult to describe the political condition of the larger island. It appears that formerly it was divided into three grand districts ; viz., *Hifo* on the West, under the peculiar authority of the *Toui-kanaka-bolo* ; *Moua*, in the centre ; and *Hogui* on the East. The southernmost bears the general name of *Legoo*, but from what reason D'Urville was not acquainted.§

Tasman, when he discovered the islands, anchored in a bay in the western part of the island, which he called *Van Diemen Road* ; a second bay was named by him *Maria Bay* ; these two names, which are elsewhere applied, perpetuate the attachment he had for the daughter of the Dutch governor of the East Indies. In 1773 Cook also anchored in the first of these bays, but he does not speak well

* The highest point is the fortress of Niukalofa, the scene of many of the exploits which Mariner relates, and on it now stands a christian church. The view from it is extensive, over the island on one hand, and over the coral reefs and the deep ocean on the other.

† Wilson, p. 275.

‡ Narrative of the United States' Exploring Expedition, vol. iii. p. 32.

§ Voyage de *L'Astrolabe*, vol. iv. p. 227 ; Narrative of the United States' Exploring Expedition, vol. iii. p. 29. Licoo (*Legoo*), according to Mariner, is the name given to the back or unfrequented part of any island which is generally bold and rocky, and not fitted for the entrance of canoes. Some parts of the Licoo of Vavao were particularly romantic.—*Account of the Tonga Islands*, vol. ii. p. 336.

of it; he found a safe road in the northern part of the island, formed to the S.E. by the coast of Tonga-tabu, and to the East and E.N.E. by two small islands, *Panghāi-motu* (Pangimadoo of Cook) and *Hoolaiva*.

This harbour is a well-determined position. Cook stayed three months in the Friendly Islands, and referred all his chronometric measurements to this. D'Entrecasteaux established his observatory on Panghāi-motu (Pangimadoo). Cook referred his position to a tongue of land on the chief island a mile to the southward. This latter is in lat. $21^{\circ} 8' 19''$, lon. $175^{\circ} 14' 45''$ W. The variation was $10^{\circ} 13'$ E., the dip, $39^{\circ} 1'$, in 1777. High water, full and change, $6^h 58'$; the tide rises 4 feet 9 inches at springs, and 3 feet 6 inches at neaps; the flood running to S.E., and the ebb returning to the same direction.

This road or harbour has two entrances; one from the East, the other from the North. The first is between the coast of Tonga-tabu and a chain of islets and reefs; the length of the passage is 3 leagues in an East and West direction, and $1\frac{1}{4}$ miles broad, reckoning at a small island lying precisely in the opening of the road; this entrance is preferable to the northern one, and is called the *Astrolabe Channel* by D'Urville.

The following directions for making Tonga-tabu, and entering this anchorage, are by Mr. David Duncan, Master of H.M.S. *Zebra*:—"Ships running for Tonga-tabu should try to make the Island of Eoa, which is moderately high; and, if toward evening, should keep off and on during the night, not losing sight of it if possible, as there is a current setting to the westward.

"At daylight bear up for the Island of Eooajii, which leave on your starboard hand, keeping over towards the reef surrounding the Island of Tonga, which makes low. As you draw in, keep close to the reef on the larboard hand, for the passage cannot be seen until close-to; but with a good lookout at the mast-head, and keeping the larboard reef close on board, it will be seen on the starboard bow.

"In the narrowest part of the passage there is a sunken rock, which you will avoid by still keeping the larboard reef close on board. After passing this, you have a clear passage up to the anchorage, which is under some small islands to the eastward; or run to the westward, and anchor in 16 fathoms, about a mile from the shore, abreast of a flagstaff erected by the missionaries, on which is generally a flag.

"There is a pilot; but he seldom comes out until you have passed the narrowest part of the passage, and then he is not required. The course is N.N.W. $\frac{1}{4}$ W., which will take you clear of all danger, by keeping a lookout at the mast-head. It is high water, at full and change, at 8^h ; and the rise of tide is $8\frac{1}{2}$ feet with easterly winds.

"In running up to the northward, you pass Hounga Hapaī, and Hounga Tonga, represented in the charts as three islands, but there are only two. They appear to be clear of danger, and only require to be kept at a reasonable distance."*

Capt. Worth, H.M.S. *Calypso*, came here in 1848, and gives the following account of his progress:—

* Nautical Magazine, 1853, p. 503.

“ We bore up for the entrance of the Astrolabe Channel, which we reached at 10^h 30' A. M., passing midway between the East end of Tonga and the Island of Eooajii, the wind still blowing strong from N.E., with squalls and a high sea, which was breaking with great force upon all the reefs. On entering the channel sail was shortened, and the yards braced by, in order to lessen the ship's way, the wind being right aft, and the channel very narrow, varying from half a mile to one mile in breadth, gradually narrowing till the small Island of Mohega is reached, and nearly 9 miles in length, and lays between two coral reefs, which, however, distinctly show themselves: from there being no anchorage within it, and the tides being at times very strong, great caution should be used in entering it; indeed it almost always blows directly in and through it. At nearly the end of the canal, and where the Island of Mohega appears to close it, the passage takes a sharp turn to the northward, requiring the ship to be braced sharp up, laying N.N.W., in order to weather the port or western reef; in doing which care must be taken to avoid running on a shoal laying close off Sotarbt, or eastern reef, as it is necessary to pass very close to it, and which can be done without risk, it having deep water close alongside of it. Wilkes states in his work that he ran upon this coral patch in the *Vincennes*, and that she came off without danger, the shoal breaking away under the ship's bottom; and that, after anchorage at Niukalofa, the spot was examined, but that no shoal existed where his ship struck; and that he had the satisfaction of knowing that it had been destroyed without injury to the ship. This, however, must be an error, for, being myself on the bowsprit whilst running through this narrow part of the channel, I observed a shoal close under the starboard bow, and had barely time to order the helm to be put a-starboard to prevent the ship running right upon it, and which she barely cleared. Conceiving this to be the same shoal spoken of by Capt. Wilkes, I sent the master, the day after we anchored at Niukalofa, to examine it, barely covered with the water. I cannot, of course, positively say that this is the shoal Capt. Wilkes alludes to, but, from his description of its position, I cannot fancy it can be any other, particularly as he names but one shoal as existing in the channel at the time he sailed through it, and states that, with that exception, the whole channel was perfectly clear; and which statement is quite correct. On passing this narrow part of the channel, we bore away for the anchorage off the town of Niukalofa, anchoring at noon in 14 fathoms; Monuaffe Island bearing N.E. by E. $\frac{1}{2}$ E.; Fafoa Island, N.E. by N., and distant from the shore about a quarter of a mile.

This anchorage is very good, and is well sheltered by the surrounding reefs.

The *North Passage*, by the N.E. of *Atata Island*, is thus described by Capt. Drinkwater Bethune, who came hither in H.M.S. *Conway* :—

“ Having rounded the West end of the island, avoiding some reefs off it, all of which I believe are visible, I ran to the E.N.E. until past the Island of Atata. The passage into which I entered is to the northward of the middle reef, which is circular, and lies N.E. from Atata. The passage is about half a mile wide, with another reef about that distance North from the circular one. Having entered betwixt these two, it is necessary to keep to the S.E. for about 1 $\frac{1}{2}$ miles, to avoid some stones that lie off the middle reef, and then haul up South by compass for

Niukalofa, which may be distinguished by the church, built on the only rising ground near. I anchored in 14 fathoms, with the small reef bearing North, the church South, Panghai-motu E. by N., just shetting in the distant main land. With the prevailing S.E. winds the usual passage in is between the East end of Tonga and Eoa Islands to the anchorage under Panghai-motu. The North passage is to be preferred in going out, the passage West of Atata being narrow and intricate, and therefore should not be attempted without a leading wind.

"*Niukalofa* is the principal christian town, and the residence of the missionaries. The population of the island is 5,000, of which 1,000 are Christians. The principal heathen settlements are Bea, about 5 miles from Niukalofa; and Mua, about the same distance up the creek, round Panghai-motu. The water is bad, and not plentiful. Pigs, yams, &c., may be obtained. The landing is awkward, as a reef extends a quarter of a mile from the shore; but just to the eastward of the church a cut has been made, which admits a boat to approach the shore at high water. King Josias promised me that he would build a wharf out into deep water. A pilot will come off on a signal being made."*

Admiral D'Urville gives the following account:—

"The *Fafaa Reef* extends nearly a mile to the West. Up to this the depth varies from 18 to 10 fathoms; but as soon as you reach the line joining Malinoa and Holoa, the bottom has patches of coral, some of which have not more than $3\frac{1}{2}$ fathoms on them, and perhaps less.† The mouth of the pass is between the N.E. extreme of the Atata Reef and a bank of detached reefs more to the East, is about 3 miles N.E. $\frac{1}{2}$ N. from Atata, and is not more than 1,600 yards wide. It is quite safe throughout, and easily made.

"In leaving the anchorage of Panghai-motu to reach this passage, steer first for the point of the Fafaa Reef, and from this to N.N.W. for 4 miles. You will then see the two reefs, taking care to keep close to the wind. The channel is hardly half a mile long; then steering to N.W. you will soon be clear of the breakers to the North of Tonga-tabu."‡

NORTH STAR REEF, a dangerous outlying coral bank, on which H.M.S. *North Star* touched in 1844, lies N. 54° E. 17 miles from Tonga-tabu, or, according to Lient. Raper, in lat. $19^{\circ} 20' S.$, lon. $173^{\circ} 45' W.$ She touched only for an instant, and had 7, 9, 10, and 18 fathoms immediately afterwards.§

Two small islands, *Hounga Tonga* and *Hounga Hapai*, lie between Tonga-tabu and Namuka. They are each about $1\frac{1}{2}$ miles in circuit, and are merely gigantic rocks, 150 feet high, and may be seen 15 leagues off.||

NAMUKA GROUP.

The principal island of this group is that which gives it the name, *Annamooka*, according to Cook; or *Namocka*, according to Mariner.

* Nautical Magazine, July, 1839, p. 449.

† The *Astrolabe*, in entering, struck on a coral lump, but knocked off the opposing body without injury to the vessel. The ship was in very great danger of being lost in entering the anchorage after this (see vol. iv. pp. 373-4); she struck, and became fixed on the reef, but providentially floated off when her destruction appeared inevitable (vol. iv. p. 51).

‡ D'Urville, vol. iv. p. 98.

§ Sydney Herald; Naut. Mag., July, 1843, p. 482.

|| Nautical Magazine, December, 1849, p. 636.

NAMUKA is rather higher than the small surrounding islets, but still is low. It is composed of a steep, rugged, coral rock, 9 or 10 feet high, except where there are two sandy beaches, defended, however, by coral reefs to seaward. In the centre of the island is a salt-water lake, without communication with the sea, and about $1\frac{1}{2}$ miles broad. Cook found the island to be well cultivated, chiefly with yams and plantains, with bread-fruit and cocoa-nut trees interspersed.*

To the North and East of Namuka the sea is sprinkled with a vast number of small islands. They lie scattered at unequal distances, and are in general as high as Namuka, but only from 2 or 3 miles to half a mile in length, and some less. Most of them are entirely clothed with trees, among which are many cocoa palms, and each forms a prospect like a beautiful garden placed in the sea.

The CULEBRAS BANK lies somewhere to the westward of the Namuka Islands, and was discovered by Maurelle. It does not exist in the position assigned to it, but is more likely nearer the land. La Pérouse saw it in 1787; according to him it is 6 miles in extent, N. by W. and S. by E.†

The HAPAĪ GROUP, or, as it is otherwise spelt, Hapae, Habai, or Havaii, was discovered by Cook in his third voyage, and is composed of four larger and numerous smaller islands, connected by coral reefs, so that they are considered by the inhabitants as but forming one island. Cook named them *Haano*, *Eoa*, *Lefouka*, and *Hoolaiva*.

These islands are very low; the reefs do not extend more than a quarter of a mile on the eastern side of the northernmost islands. In rounding Haano, the northernmost, it is necessary to give the N.W. point a berth of half a mile, to avoid a reef off it. From the point, N. 41° E., true, 6 miles, lies a bank with only 3 fathoms on it.

LEFOUKA (or Leefooga, or Lifuka), one of the islands on the eastern bank, is the most interesting, as it was on this that Mariner chiefly resided, between 1806 and 1816, as described on a previous page. It is also one of the three missionary stations in the Friendly Islands, Vavao and Tonga-tabu being the others.

Lefouka is not above 7 miles long, and, in some places, not above 2 or 3 broad. The East side of it, which is exposed to the trade wind, has a reef running to a considerable breadth from it, on which the sea breaks with great violence.‡ It is a continuation of this reef that joins Lefouka to Eoa, which is not above half a mile distant; at low water the natives pass on foot from one island to another. No good water could be got; that which was procured was execrable. Near the South end of the island, and on the West side, they found an artificial mount 40 feet high, and 50 feet in diameter at its summit.

"We stood in for the Island of Lefouka, running along to the westward of the islands Haano and Eoa, and at 9^h A.M. (August 23, 1848) anchored in 17 fathoms; the West end of Haano, N. $\frac{3}{4}$ E., and the North end of Lefouka, E. $\frac{3}{4}$ S.; the

* Cook's Third Voyage, vol. i. p. 236; Second Voyage, vol. ii. p. 9. His anchorage at both times was that probably taken by Tasman, the discoverer, in 1643. See Dalrymple's Collection, vol. ii. pp. 79, 80.

† Voyage de La Pérouse, vol. iii. p. 251.

‡ M. Vincendon-Dumoulin states that a coral reef to the East of Lefouka serves as a base to a coral island.—*Annales Hydrographique*, vol. i. p. 254.

latter distant $2\frac{1}{2}$ miles, and from the nearest reef half a mile. Although we did not observe any shoals whilst running for the anchorage, I was afterwards informed that many existed, and great caution should be used in sailing in and out of this part of the group.

"The anchorage off Lefouka, where resides King George, king of the whole group comprising the Friendly Islands, is in lat. $19^{\circ} 48' 12''$, lon. $174^{\circ} 20' W.$, and is by no means a good anchorage, being much exposed to the bad weather and high sea from the westward, the outstanding reefs affording but little or no shelter from the violent gales from that quarter which frequently occur, particularly in February and March."*

Hoolaiwa is also connected to Lefouka by a coral reef, partly dry at low water. There was no trace of habitation or cultivation on it, which, by contrast, was rather extraordinary. Here, too, is an artificial mount. The East side of it has a reef like Lefouka, and the West side has a bending at the North part, where there seemed to be good anchorage.

The KOTOO GROUP may be almost considered as a portion of the Hapai Group, as the distinction is not so well marked as in the others, being more or less connected together by coral reefs. According to Cook they are separated from them by a channel 7 or 8 miles broad, but which is narrowed by a reef; the two islands forming the North end of this channel are *Neeneva* to the East, and *Foutoua*, or *Footooa*, to the West. The largest island of the group is called Kotoo, and is scarcely 2 miles long, and about the same breadth; a coral reef surrounds it. Its N.W. extremity is as low as Hapai, and around it are eight other islands, as shown on the charts.†

TOFOUA, or *Tofoa*, an active volcanic island, lies to the N.W. of Kotoo, in lat. $19^{\circ} 45' S.$, lon. $175^{\circ} 3' W.$, according to D'Urville, and is about 2,800 feet high. A remarkable lake is said to exist on it, from which the islanders bring small black volcanic pebbles, which are much in request, to cover the graves of their friends. It is covered with trees to the summit, and is about 5 miles in diameter.

Tofoua was in strong action at the time of Cook's second visit; they saw the smoke at Namuka, 10 leagues off. He was told that it was but thinly inhabited, but the water upon it was good.

KAO is a vast rock of a conical figure, about 5,000 feet high, to the N.E. of Tofoua. Its summit, according to D'Urville, is in lat. $19^{\circ} 41' 35''$, lon. $174^{\circ} 59' 50''$.

VAVAU GROUP.

This, which is the northernmost cluster, is one of the most important, as it is perhaps as much frequented as any. It lies 70 miles N.N.E. of the Hapai Group, but the intervening space is much contracted by coral shoals, more so than has been supposed, for two shoals at least have been discovered in the space formerly considered clear, which separates them there.

* Capt. Worth, H.M.S. *Calypso*, 1848.

† According to M. Vincendon-Dumoulin's chart, a shoal, discovered in 1845, lies in lat. $20^{\circ} 9' S.$, lon. $175^{\circ} 8' W.$; that is, to the S.W. of Kotoo.

The DISNEY SHOAL, a very dangerous reef, lies some 45 miles to the S.E. of Vavau. It was first seen in the *Frolic* whaler, October 29th, 1841. Capt. Disney obtained soundings in 9 fathoms, sand and coral rock, deepening to 40 fathoms; but, from appearances, there was much less water than this. Lat. $19^{\circ} 15' S.$, lon. $173^{\circ} 40' W.$ *

The HOME SHOAL, which we venture so to call from Sir Everard Home, who fixed its position in 1844, lies in lat. $19^{\circ} 4' S.$, lon. $174^{\circ} 39'$, and is of coral, thus lying to the S.S.W. of the peak of Lette.

VAVAU is the principal island of the group. Although Cook makes frequent mention of it in his Third Voyage, Maurelle was the first to visit it, in 1781, when he named them *Martin de Mayorga Islands*. La Pérouse saw them, but did not anchor. Capt. Edwards visited them in H.M.S. *Pandora*, in 1791, and called them *Lord Howe's Islands*, and to the different islands of the group he gave the names of *Barrington*, *Sawyer*, *Hotham*, and *Jervis*; and the fine Port Refugio of Maurelle he calls Curtis Sound. Malespina made some stay here, in Port Refugio: Sir Everard Home thus describes it:—

“The Island of Vavau, when approached from the West, has a very remarkable appearance; it is highest towards the North, sloping gradually to the South; the whole is a group of numerous islands, which, with few exceptions, show abrupt sides; towards the North steep cliffs, forming angles 70° or 80° with the horizon. The extreme point North is of moderate height, but South of it there is a bold head of considerable height, forming an angle with the horizon of 75° or 80° . This is on part of the main Island of Vavau; two others like it to the southward are islands, the land gradually sloping to the South. Towards the northern end of Vavau there is a remarkable piece of table land, the highest, and from which the land slopes off, all southward of it being islands of regular form, and low: the entrance is South of the highest head before mentioned. The peak of the Island of Lette bore S. $68^{\circ} W.$; the North head or highest head, N. $25^{\circ} E.$; and the South head bore South; this head is the North extreme of a larger island, the southern extremity of which bore S. $55^{\circ} W.$ When standing in with the North head on the larboard hand, two remarkable round rocky islands will appear; their tops are flat, and covered with brushwood, the lower half to the water's edge bare rock; they cannot be mistaken. Between the northernmost of the two islands and the main there is a detached rock; passing between these two large rocks or small islands a rocky point will be seen upon the left, bearing S. $83^{\circ} E.$; after rounding which, at about a cable's length, another point, more high and covered with trees to the water's edge, will appear also on the left, bearing N. $47^{\circ} E.$; the passage appears narrow; southward and eastward the land is composed of islands very numerous, and showing several openings to the sea, between some of which the breakers extend quite across; the eye guided us in. A lumpish hill covered with trees will soon open, and a small low green island, which is left upon the right hand. At six we anchored under this hill in 30 fathoms water, sand, with a sandy point N.E., and the hill North; the village is to be seen upon a rising ground; there is a hill at the back of it. These islands are all formed of a hard

rock, quite white, and, as I believe, of coral origin : they are thickly covered with trees of various sorts, and all of a very deep green. Cocoa-nuts appear to be most numerous. These islands, clothed as they are, and the rocks often showing between the foliage, the variety of their forms, tints, and sandy bays, give the harbour a most beautiful appearance. Passing on, the natives are seen in numerous groups, lying under the trees; and canoes are seen passing and repassing in various directions. A few, and a very few, patches of cleared ground are to be seen upon the hills.

"A gun had been fired, and the pilot-signal was made when entering the heads, but no attention was paid to it. A little after two p.m. a canoe came out from the town, and returned immediately on learning what the ship was, to report the circumstance to King George.

"The village of Neafu, like Niukalofa at Tonga-tabu, is rendered conspicuous by the large boat-houses upon the beach, their gables open to the sea. From the anchorage to the village the water is deep, the shoalest being 5 fathoms, but the bottom is bad. The usual anchorage above Sandy Point is secure; the bottom is sand. As soon as the ship was anchored, a large canoe, well manned and in high order, came to the ship, bringing an Englishman, a servant to the mission, with a message from King George, requesting to know what he could do for us, and offering any assistance in his power. I replied, 'I should call upon him the next day.' I landed upon a good stone pier built by King George, and was met on landing by the same person who had been sent to the ship.

"There is here a neat church, formed like all the other native buildings. It is larger than that at Tonga, and is ornamented only by the coloured sinnet which binds the timbers; a large building near it is the schoolroom. The king's house is the third building of any magnitude, which is enclosed by a closely wove fence; they all stand upon a lawn of grass; the cottages of the inhabitants were upon the lower ground surrounding these buildings. The houses of the missionaries are in a sort of street at no great distance from the church; there are three, having good gardens enclosed by a regular fence of reeds; they are neat and comfortable. One missionary is a printer, and here is a very good press, where the testament and prayer books, having been translated, are printed, with the best school books, and from hence are distributed, neatly bound, over the neighbouring islands.

"I am informed by Mr. Turner, the principal missionary on the island, that the population of the island is above 4,000, but does not amount to 5,000; they are all Protestants. The only persons upon the island not natives are the three missionaries, the compositor, and a carpenter, who are English, one Spaniard, and one Portuguese."*

PORT REFUGE lies off the West point of the island, its South end being formed by the islands which front PORT VALDEZ, above described by Sir Everard Home. The village of Neafu stands in lat. 18° 38' 20" S., and lon. 174° 55' W.

We cannot here describe the coral reefs and islets which extend to the south-

* Nautical Magazine, December, 1840, pp. 634—636.

ward of Vavau. They reach to lat. $20^{\circ} 0' S$. Many interesting details of Vavau will be found in Mariner's account of the Tonga Islands.

LATTE or LETTE ISLAND lies to the West of the Vavau Group. It is a high island, formerly a volcano. The peak, about 1,600 feet high, is in the centre of the island, from which the hill falls with a pretty gradual slope into the sea. The island is 6 or 7 miles in circumference, and is sufficiently high to be seen at 20 leagues off. Edwards calls it *Bickerton Island*. From the observations of D'Urville, in the *Astrolabe* and *Zélée*, it is in lat. $18^{\circ} 45' 15''$, lon. $174^{\circ} 28' W$.

A line of breakers lies a considerable distance West of the island; they were seen by Sir Everard Home, and appeared to be caused by an extensive reef stretching East and West.

AMARGURA or FANOUALEI is the northernmost of the group. Maurelle named it Amargura (bitterness, Spanish), because he was disappointed in obtaining fresh provisions here. Edwards called it *Gardner's Island*. It is a barren spot. It is formed of two hills, the N.E. the highest, connected by a very low span, everywhere surrounded by rocky cliffs, except in two places on the West side. No trees, nor signs of inhabitants. Capt. Worth passed it in H.M.S. *Calypso* in 1848, and found it to be placed wrong on the chart. His position is lat. $18^{\circ} 2' S$., and lon. $174^{\circ} 16' W$.; * var. $9^{\circ} 41' E$., 1844.

MINERVA REEFS.—Two reefs are marked upon Arrowsmith's chart, near together, stated to have been discovered in 1818, by Capt. Nicholson. One is in lat. $23^{\circ} 35' S$., and $178^{\circ} 0' W$.; the other is lat. $24^{\circ} 0'$ and lon. $178^{\circ} 15' W$.; they are both 10 or 12 feet above water. According to Norie's chart, the ship *Minerva* was lost here in 1831, on the last of these reefs; they have been therefore called Minerva Reefs, as there is another, Nicholson Reef, to the East, discovered by the same ship.

FAVORITE REEF.—It is possible that the reef seen by H.M.S. *Favorite* and *Conway*, July 27, 1842, in lat. $23^{\circ} 35' S$., and lon. $180^{\circ} 49' E$., may be the same. The latter had breakers on the S.W. of it.†

KERMADEC ISLANDS.

A scattered group of islands to the N.E. of New Zealand, which has been very badly placed on the charts, is first denominated the Kermadec islands in the chart accompanying Admiral Rossel's account of D'Entrecasteaux's voyage. The first of them, Macauley and Curtis Islands, were discovered by Lieutenant Watts, in the *Penrhyn*, in 1788. Raoul Island and L'Espérance Rock were discovered in March 15, 1793, by the *Recherche* and *L'Espérance*. There has been thus some confusion of names, and this was not diminished by another island, Sunday Island, which appeared on Arrowsmith's chart, which must be identical with Raoul Island. Since their original discovery their character and position have been more exactly fixed by subsequent navigators. They are in West longitude.

* *Toku Island* is stated to be in lat. $18^{\circ} 8' S$., and lon. $174^{\circ} 8' W$. (Lieut Raper.)

† Nautical Magazine, February, 1849, p. 135.

RAOUL or SUNDAY ISLAND was discovered by Admiral D'Entrecasteaux, March 15, 1793. It is of a triangular form, and not more than 4 leagues in circuit. It forms a high, rugged mountain, very steep, and covered with wood.* Wilkes says it has every appearance of being volcanic, and the rocks rise like basaltic columns. The island affords no anchorage. Wilkes places it in lat. $29^{\circ} 12' S.$, and lon. $178^{\circ} 15' W.$ According to D'Entrecasteaux, its N.W. point is in lat. $29^{\circ} 16' 45'' S.$, and lon. $178^{\circ} 5' W.$ It is said to be inhabited (1840) by a few white men.† It is the same island as Sunday Island of Arrowsmith's chart.

To the southward of Raoul are Macauley and Curtis Islands. They were discovered in the *Penrhyn*, as related by Lieutenant Watts.

MACAULEY ISLAND is a small, round island, very steep, with some tufts of herbage and a few bushes, but not a single tree. It is about 3 miles in circumference, and its height may be about 750 feet. Off its S.E. point is a small rock half a cable's length distant. Lat. $30^{\circ} 16'$, lon. $178^{\circ} 32' W.$

CURTIS ISLAND is composed of two rocks of moderate height; the largest, which is double the size of the other, is half a mile in length: they may be about 500 feet. The channel separating them is about 400 yards wide. They are resorted to by numberless birds. Lat. $30^{\circ} 36' S.$, lon. $179^{\circ} 14' W.$ —(D'Urville.)

L'ESPERANCE ROCK (*Brind's or French Rock*) is very high, and of small extent, and is placed by D'Entrecasteaux in lat. $31^{\circ} 27' 30''$, lon. $181^{\circ} 5' E.$ ‡ The *Havre Rock* near to it, was seen by a whaler in about lat. $31^{\circ} 18' S.$, lon. $178^{\circ} 52' W.$

A DRY SHOAL, discovered in 1838, lies in lat. $21^{\circ} 40' S.$, lon. $174^{\circ} 40' E.$ This position is also confirmed in some degree by a private communication.

MATTHEW ISLAND was discovered by Capt. Gilbert in the *Charlotte*, May 26, 1788. It is a conical rock, about a mile in circumference, 1,186 feet high, and is a volcano, sometimes in activity. From the southward, at a distance, say of 20 miles, it appears as two, one a peaked rock, and the other part flat. This has probably given rise to the statement of Capt. Fearn, of the existence of a flat rock to the northward of it.§ If this is not the case, the flat rock has disappeared by volcanic or other means. There appears to be a reef round the South and East ends of the island, at about half a mile from the shore, on which the sea breaks heavily. In the *Nautical Magazine* for July, 1841, Capt. W. Goodwyn, of the *Florentia*, says, that on the 15th March (no date) his attention was attracted by a singular white cloud, which, on a closer examination, proved to be smoke from Matthew Island, just on the horizon. He stood on to within 4 miles of the East end of the island, and on opening the

* Voyage de D'Entrecasteaux, vol. i. p. 275.

† Voyage de *L'Astrolabe* (D'Urville), tome iii. p. 7.

‡ Two degrees to the West of Macauley Island some breakers were stated to have been discovered in 1811, which Arrowsmith considered to be the same as the *Rosaretta Reef* of 1807. Five degrees still farther West, Capt. Wilkes passed over the position of the former, and confidently states its non-existence in that place.—*Wilkes*, vol. iii. p. 5.

§ Krusenstern, vol. i. p. 22; *Nautical Magazine*, July, 1841, p. 449; *Wilkes*, vol. ii. p. 159; *Purdy's Tables*, p. 94; *Oriental Navigator*, p. 697.

northern point, saw at times a body of fire running from the summit to the base, in a cleft or chasm, to the water's edge. It was watched until a very late hour with the same appearances.

Capt. Wilkes saw great numbers of birds upon and around it, and places it in lat. $22^{\circ} 27' S.$, lon. $172^{\circ} 10' 33'' E.$

HUNTER ISLAND was discovered by Capt. Fearn, in the ship *Hunter*, in 1798. It is small, but high enough to be seen 11 or 12 leagues off. It was also described by Capt. Fearn as being 14 leagues from Matthew Island.*

LA BRILLANTE SHOAL is a very dangerous reef, discovered in the French corvette *La Brillante*, under the command of M. Le Comte Dubouzet, 28th August, 1847. It appeared to be a mass of coral, of a round form, and is about 150 feet in diameter. It was the more dangerous, as the sea did not break on it, although there was a heavy swell. Two soundings in 20 and 23 fathoms were obtained; but it was thought that there were not more than $6\frac{1}{2}$ to 10 feet on it at most, as the sea was quite yellow. Its position was taken to be in lat. $23^{\circ} 13' 52'' S.$, lon. $169^{\circ} 55' 38'' E.$ †

WALPOLE ISLAND, discovered by Capt. Butler, of the *Walpole*, November 17, 1794, is only about a mile in extent, about 200 feet in height, with high, perpendicular cliffs on the West side. It is covered with brushwood, and a landing might, perhaps, in fine weather, be effected on some parts of the East side. It cannot be seen more than 7 or 8 leagues off, and Capt. Butler says, had the greatest quantity of birds on it he ever saw. Lat. $22^{\circ} 40' S.$, lon. $169^{\circ} 15' E.$ ‡

DURAND'S REEF, seen the same day as Walpole Island, by Capt. Butler, is in lat. $22^{\circ} 6' S.$, lon. $169^{\circ} 2' E.$ The rocks broke in seven places, the centre one the highest, breaking as high as the maintop, and supposed to extend 4 or 5 miles.§

NEW CALEDONIA.

To the same great navigator to whom so much of our knowledge of the Pacific is owing, are we indebted for the discovery (in 1774) of this the largest island in the great ocean except New Zealand. It is the only one of his numerous discoveries, too, that he did not make a complete examination of. Capt. Cook attempted to sail around its North extremity, but, on reaching lat. $19^{\circ} 17'$, he found that a line of reefs extended beyond his view to the northward, which his want of time prevented him from following up. He then essayed to round its South end, but met with a similar repulse, and thus he abandoned it for that time. The French commander, Admiral D'Entrecasteaux, completed what Cook

* *Oriental Navigator*, p. 697.

† *Sydney Gazette*, October 14th, 1847.

‡ Krusenstern states that Capt. Golownin, in 1817, and Capt. Kroustchef, in 1820, sought for Walpole Island in the above position, but without success.

§ *Oriental Navigator*, p. 600; *Nautical Magazine*, November, 1848, p. 574.

had left undone. He examined both the N.E. and S.W. sides of the island, and determined the limits of the frightful chain of reefs which form a continuation of the island both at its N.W. and S.E. extremities, the former reaching 50 leagues from the end of the island. His stay in Port Balade, where Cook also remained, gave him the opportunity of reversing the opinion that Cook had formed of the natives. He found them to be the same fierce cannibal race that are described to exist at the Feejee Islands; Cook thought them more mild and peaceable than the Friendly Islanders. We shall presently give some recent remarks which confirm what D'Entrecasteaux experienced. Besides these two navigators, H.M.S. *Sulphur*, and other ships have visited it, as will be noticed.

New Caledonia is about 200 miles in length; but with the banks connected with it is 400 miles from N.W. by W. to S.E. by E. The greatest breadth is not more than 30 or 40 miles.

According to the description of Capt. Cook, this large island is a country full of hills and valleys, of various extent, both for height and depth. From the hills spring many rivulets, which greatly contribute to fertilize the plains, and to supply the wants of the inhabitants. The summits of most of the hills seem to be barren, though some few are clothed with wood, as are all the plains and valleys. "By reason of these hills, many parts of the coast, when at a distance from it, appear indented, or to have great inlets between the hills; but, when we came near the shore, we always found such places shut up with low land, and also observed low land to lie along the coast, between the sea-shore and the foot of the hills. As this was the case in all such parts as we came near enough to see, it is reasonable to suppose that all the coast is so. I am likewise of opinion, that the whole or greatest part is surrounded by reefs or shoals, which render the access to it very dangerous, but, at the same time, guard the coast from the violence of the wind and sea, make it abound with fish, secure an easy and safe navigation along it for canoes, &c., and most likely form some good harbours for shipping. Most, if not every part, of the coast is inhabited, the Isle of Pines not excepted, for we saw either smoke by day, or fires by night, wherever we came."

The southern and western coasts of the island were explored by M. D'Entrecasteaux in 1792, as explained before, who has described them as presenting a frightful chain of reefs, extending beyond the islands, and barring the sea for the space of 324 miles from S.E. to N.W. In the vicinity there are also many little islands surrounded with reefs, and linked together by shallows. "New Caledonia, viewed from the sea, presents three ranks of mountains of different heights, an appearance in general barren, and signs of a small population."

The people and vegetable productions appeared to be much like those of Van Diemen's Land. The inhabitants have frizzled hair, are of a moderate stature, and are as black as those of Van Diemen. They seem to be unacquainted with the use of the bow; but are armed with darts and clubs, which they make with much care. Slings are also used. They subsist chiefly on fish, shell-fish, and vegetables. The women only have a girdle of bark fibres. Those who inhabit the mountains are extremely lean, have no kind of industry, and sleep in the open air. The others have huts, shaped like a beehive, which are, in general, neatly formed.

A chain of mountains appears to extend throughout the whole range of the island; they rise gradually towards the E.S.E., to about 3,200 feet above the level of the sea. Cocoa-nuts appear to cover the sides of most of the fertile valleys. Among the plants cultivated by the natives are bananas and sugar-canes.

CAPE QUEEN CHARLOTTE is the S.E. point of New Caledonia, and was thus named by Cook as Queen Charlotte's Foreland. It is in lat. $22^{\circ} 16' S.$, lon. $166^{\circ} 55'$. The reefs extend to a very considerable distance S.E. of this, but the main island here terminates.

CAPE PRINCE OF WALES, or Prince of Wales's Foreland, is the other or S.W. point of this end of New Caledonia, in lat. $22^{\circ} 29' S.$, lon. $166^{\circ} 38' E.$

BOTANY ISLAND lies on the extensive reef to the southward of the last-named cape, and is in lat. $22^{\circ} 47' S.$, lon. $167^{\circ} 1' E.$

The South extremity of the reef, which lies to the southward of this island, is in lat. $23^{\circ} 3' S.$, lon. $166^{\circ} 50' E.$ It was in this part of the reef that Capt. Hunter, in the *Waakzaamheid*, got embarrassed in 1791, and hence the bay formed between the S.W. portion and that off the Isle of Pines, is called *Waakzaamheid* * Bay.

The ISLE of PINES is the south-easternmost land of New Caledonia. We have had no particular description of it until a recent and copious one from a mercantile commander given in the Nautical Magazine for 1848. This island, and also the neighbouring country, have been visited for several years by Sydney vessels in search of sandal-wood, more especially since the cessation of the trade at the Feejee Islands. We have given the extract at length, as it will also give a clearer insight into the character of the country and its inhabitants than can be found elsewhere.

The peak of the Isle of Pines is situated in lat. $22^{\circ} 38' S.$, lon. $167^{\circ} 25' E.$ The island is 42 miles in circumference; the N.E. part is clear of reefs, with the exception of a fringe reef, extending about 100 yards from the shore; but from East, round by South and West to North, the island is connected to and surrounded by coral reefs, with many small islands, which form several good harbours inside. None of the small islands have any permanent inhabitants; but they are resorted to occasionally for fishing and catching turtle. There are also many detached shoals and coral patches within the barrier reefs. The reefs and shoals extend from the Isle of Pines in a westerly direction to the S.E. end of New Caledonia, which is about 28 miles distant, and in sight in clear weather.

Near the shore the land is generally low and rocky, with little soil, but very thickly wooded: about 2 miles inland the soil improves; and from that to the centre of the island (on the North side), the ground rises with a gentle ascent, with very little timber; and a rich alluvial soil, forming a large clear space of hundreds of acres. From this clear space the land rises gradually towards the peak (which is situated on the S.E. part of the island), and is thickly wooded to the top. There is good fresh water at the foot of the hill, but it is not convenient for shipping.

Being situated within the southern tropic, the prevailing winds are from S.E., veering round at times to E.N.E. and N.E., and generally blowing a fresh gale

* Vigilant (Dutch).

during the winter months. From November to April, northerly and westerly winds are often experienced; and sometimes, in February and March, heavy gales prevail, but they are of short duration. October and November are the hottest months in the year, the winds being generally light with much fine weather. Gales begin at the N.E., passing round to North and N.W., from which quarters they blow hardest; and as they moderate, haul round to S.W. and South. They are always accompanied with much rain and thick weather. The mean temperature during the winter months is about 75° , and in summer season about 80° . The barometer is seldom affected, except in the severe gales, when it sometimes falls as low as 29.45 inches. The tides are very irregular. It is high water on full and change of the moon at 8^h, greatest rise and fall $5\frac{1}{2}$ feet. At neap tides there is only one tide in the twenty-four hours, and which is generally in the night; the rise and fall at that time not above 2 feet. On the first of the flood the tide runs strong in the passages through the reefs, but as soon as the reefs get covered, it then flows in all directions, and with less velocity.

If bound to VICTORIA HARBOUR (thus named by Sir Edward Belcher in 1840), get the peak to bear S.W., then steer for it, and when within a quarter of a mile of the reef bear away to the westward, keeping it close aboard. So soon as it terminates you will see the small island bearing from you about South; that island forms the East side of the channel; and a reef, with a small sand-bank on it, forms the West side. The channel is not above 200 yards wide, and the course in is about South; borrow on the sand-bank side, as a coral ledge runs from the Pine Island some distance.

After getting inside, steer for a small rocky islet which you will see on your larboard bow; leave it on your larboard hand, and anchor between it and the main in 3 or 5 fathoms, coral and sand.

If the wind will not allow a vessel to lay through the small channel, she will require to run down along the reef for the large entrance. It is half a mile wide, and the peak bears S.E. from it. In working in, keep a good lookout for a large coral patch, which lies a little inside the entrance; leave it on the starboard hand, and work up inside the reef for Victoria Harbour, keeping a good lookout from the mast-head for coral patches, of which there are several. In working a ship amongst coral reefs, a careful and experienced officer ought always to be at the topmast head. All dangers can be seen from aloft when the sun is not ahead.

If bound in to the S.E. harbour, steer in for the land, with peak bearing about West, until you get near the two sand islets which lie from 3 to 4 miles from the shore (to which they are connected by reefs, and are very dangerous in a dark night); when abreast of them, and within a quarter or half a mile, steer to the south-westward for some rocky islets, which will be then seen; they form the South side of the Seven Fathom Bar Channel. After getting about halfway between them and the woody island which forms the North side of the channel, you may then steer to the westward, crossing the bar about mid-channel; then steer towards the peak, keeping a good lookout for some black rocks 2 or 3 feet above water, which lie fronting the cove; or a vessel may anchor in the cove in 5

fathoms, as it is clear of coral patches. You may pass the rocks on either side, but if to the southward, be sure and give them a good berth.

Many species of fine timber grow on the island. The sandal-wood tree is found on the level ground 1 or 2 miles inland; and those that I have seen cut were found in places destitute of soil, and on coral rock. After getting inland, clear of the coral flats, the vegetation is very luxuriant all over the island.

There are numerous pine trees growing on the island, some of which are very large, and similar to the Norfolk Island pine.

The *natives* of the Isle of Pines are generally about the middle size, and in complexion between the black and copper-coloured races. Although dark in colour, they have nothing of the Negro appearance about them. Their faces are well formed, with rather a large mouth and a fine set of teeth; but there is something restless and savage-looking about the expression of their countenance. Their hair has a frizzly appearance, and they generally comb it out in a mop-like form.

The males are circumcised, and both sexes go nearly in a state of nudity. They are great thieves, extremely ferocious and treacherous, and so addicted to lying, that it is hardly possible to get the truth out of them; they consider stealing and lying as great accomplishments. Although in the lowest state of savage barbarity, yet they are possessed of great cunning, and are quite as well versed in villainy as the worst characters in our country.

The natives of the Isles of Pines are cannibals, and always eat the bodies of their enemies slain in battle, not merely to gratify their revenge, but to satisfy their craving appetite for this sort of food: and the operation of cutting up and cooking their victims is gone through without the least emotion or feeling of shame. They are extremely cruel, void of affection, and are truly wretches in every sense of the word, degraded beyond the power of conception. All aged and decrepid persons, and men, women, and children, who have been long ill of a lingering disease, are either put to death by their relations, or carried to one of the small islands, and left there to perish without food. With regard to the population, I found it impossible to obtain correct information. From the number of villages and natives I have seen at different parts of the island, I should take it to be not less than 2,500 souls. All the villages are situated near the coast, and are built among groves of cocoa-nut trees. There are no inhabitants in the interior of the island.

Their food consists of yams, taro, sweet potatoes, bananas, sugar-cane, cocoanuts, and fish. They bake their food in ovens, made by heating stones, and are cleanly in their cooking and eating.

Polygamy is practised at this island, and a promiscuous intercourse of the sexes before marriage is allowed.

With respect to the religious or rather superstitious observances of these islanders, I may remark that right and wrong are utterly unknown to them. Murder, cannibalism, theft, covetousness, lying, and knavery of every description, are not looked upon as sins.

Vessels visiting the islands for the purpose of trade ought to be well armed, and continually guarded against treachery, as the natives are not by any means to be trusted. The brig *Star*, of Tahiti, was cut off at this island by the natives

in 1842, and all hands murdered. The articles most in request are tomahawks, adzes, cloth, knives, fish-hooks, and large blue glass beads.*

WOODIN'S CHANNEL.—There is one feature of the coral reefs, which, owing to their peculiar formation, is of some service to the mariner; for, wherever there is any very extensive area covered with coral growth, there is most usually deep-water channels between its various portions. These may be intricate, and even without outlet, yet they will allow a ship, with great care and in fine weather, to traverse spaces at first sight impracticable. Of such a character is the reef off the South end of New Caledonia. Capt. Woodin, the commander of a sandal-wood trader, discovered a passage through the reef. The following is an abstract of his account of it:—

“December 1, 1847.—Set sail from the East side of New Caledonia, resolving to find, if possible, a passage between Botany Isle and the South end of New Caledonia, thereby saving a tedious passage round the reef, which extends South of Caledonia. Fortunately I succeeded, and passed through a good channel with deep water, and but few dangers in the way. On proceeding round, I found the South part of New Caledonia to be an island about 10 miles in extent, with a deep-water channel from shore to shore, and room enough for a frigate to work through. I named it Woodin's Channel, as I believe I was the first person who had navigated a ship round the South end of New Caledonia, inside the reefs.

“In the channel above mentioned there are several deep bays, with abundance of fresh water running down the sides of the mountains close to the beach. Ships could anchor in any of the bays, with 15 fathoms or less, as circumstances may require. I examined the whole of the coast, from Botany Isle to the extent of the channel, in search of sandal-wood, but found none.”†

The S.W. coast of New Caledonia is still more dangerous than the N.E., being throughout its entire length bordered by a chain of reefs, which extend from 4 to 8 miles from the land. The S.W. winds, which blow strongly, and are the most prevalent here, render it still more to be avoided, because there is but one known point which will afford shelter.

PORT ST. VINCENT, the harbour referred to, was overlooked by D'Entrecasteaux, who only saw the opening. Being at a distance, he thought he might be mistaken, and so marked it on his chart *Havre Trompeur*. Capt. Kent discovered its capabilities in 1793, and called it Port St. Vincent; its entrance is in lat. 22° 10', lon. 165° 55' E. It has been described by this gentleman, as formed by islands, many of them of considerable size, and situated about 4 miles within the coral reef that extends along the S.W. coast, at a varying distance of 4 to 8 miles. This reef constitutes a wall to seaward, which is level with the

* Nautical Magazine, October, 1848, pp. 513-4. Capt. Woodin states that the natives are not generally hostile to Europeans, for in many parts of the island he has, with his own boat's crew, been treated with great kindness, without the means of making them any return; and on some occasions, with as much as could be expected from his own countrymen, or perhaps more so. Perhaps in many of the sad instances recorded of ferocity and vindictiveness the white man has been the aggressor. Yet still these savages, for such they really are, ought never to be trusted.

† Sydney Herald, March 30, 1848. Capt. Woodin learnt here that part of a ship's crew had been cut off in a bay in this channel; this was without provocation from the seamen. The ship, the *Yanguard*, had procured sandal-wood here.

water's edge, and so steep that no soundings can be found, in most parts, with a line of 150 fathoms.

The entrance of the harbour, three-quarters of a mile wide, is formed by a break in the reefs, and has in the middle 51 fathoms. The heads of the port, in the passage within, are on two isles, now called King's and Paterson's Islands. This passage is about a quarter of a mile wide, and its depth in mid-channel is 19 fathoms.

To ships sailing *in* and *out* of the harbour, the general wind, at S.E., will be upon the beam; but, should it incline more easterly off the land, there will be no danger in going in: for, by passing within a cable's length of the S.E. point of the reef, and getting within it, a vessel may anchor in 10 or 12 fathoms, muddy bottom, well sheltered, with the water perfectly smooth. Within the two points of the reef, the channel widens to the south-eastward, between the reef and King's Island, and there is plenty of room for working in the largest ship, to the heads of the harbour, if the wind be not over strong. Within the heads there is anchorage in from 10 fathoms decreasing, in perfect security. Tide rises 5 or 6 feet; high water, 8^h 15'; variation, 11° E. The harbour abounds with fish, with great quantities of shell-fish on the reefs and shores. The islands are high and rocky, but covered in many parts with fine grass; on some of them many human bones were seen. The natives often visited the people of the *Buffalo*, bringing with them spears, clubs, fishing-nets, fish, yams, and sugar-canes.

In the passage between Robbin's and King's Islands, on the South side of the middle ground, there is plenty of water for any ship, and S.E. of this passage there are a number of islands, forming, perhaps, many harbours equal to Port St. Vincent. Between Paterson's and Round Islands there is a passage to the N.W., and there are a few islands in that direction; but this passage seems not to have depth sufficient for a large ship. It is to be observed that all the islands here mentioned are within the coral reef, against the shore of New Caledonia.*

Of the S.W. coast we have no detailed particulars. The shore reef does not appear to have any opening, and only here and there a low sand island on it. The coast is apparently irregular, and in D'Entrecasteaux's chart the principal feature marked is *Point Goulvain*, in lat. 21° 46' S., lon. 165° 28' E. Here the reef is not more than half a league broad. Proceeding farther, a sand island, in the form of a crescent, facing the West, is marked in lat. 21° 35' S., lon. 165° 8' E. From this the reef commences to get wider; and in lat. 21° 29', lon. 164° 57', is the *Ile des Contrariétés*, on a projection of the reef which extends 10 miles off the land. It continues to be of this breadth, having an irregular sea-face, to the N.W. extremity of New Caledonia. *Cape Deverd* is noticed, in lat. 20° 51', lon. 164° 18' E.

CAPE TONNERRE is the N.W. point of the main island, and is in lat.

* The water which was procured on Robbin's Island was not very good, but there is probably some in other places, as the surrounding land is generally very high, and there is evidence, by the chasms in some parts of it, that torrents of rain must fall at some seasons of the year. The trees about the harbour are small, but in the valleys, between the mountains, they appeared large, and the canoes are made out of the larger ones. In order to make Port St. Vincent in search of water, or for any other reason, the edge of the reef should be made to the southward, and then coast it up to the northward till the entrance is found.—*Oriental Navigator*; Purdy's Tables, p. 94; Quarterly Review, No. 5; and Dalrymple's Collection for the Chart.

20° 24' S., lon. 164° 0', and the mountain range which extends through New Caledonia here becomes broken into a range of islands, surrounded by coral reefs. D'Entrecasteaux, in the account of his first examination, says :—"At seven in the morning, June 29th, 1792, we saw from N.N.E. to E.N.E. several mountainous islands, and some detached rocks, which render this extremity of New Caledonia still more dangerous than the South side of it. Some of these islets are several hundred fathoms in extent. A great number of rocks, of a black colour, raise their points above the water ; washed by a sea scarcely ruffled, these rocks seem to be in motion, and at first sight they might be taken for canoes riding upon the waves. It was soon discovered that these islets are numerous, for from the mast-head they were discerned as far as the eye could reach. They are surrounded by reefs, in the midst of which the sea assumes the tint of the reddish sand that covers the bottom. We reconnoitred them closely, and about eleven o'clock we were about 2 miles to the southward of one of these little islands, when we perceived breakers, which stretched off from its western point, and extended out of sight to W.N.W.

"On the 30th we discovered to the eastward a few islets, which seem to terminate this archipelago. Their height gradually diminished in proportion to their distance from New Caledonia ; they seem to be a continuation of the mountains of that large island, the bases of which, covered by the sea, rise here and there to form so many islets. The gradual diminution of the height of these mountains must induce a presumption that there are hereabouts, even to a great distance, shoals, which increase the danger of navigating these seas, a conjecture not without foundation."* The islands which D'Entrecasteaux saw here he named *Moulin*, *Reconnaissance*, *Lebert*, and *Sandy*. Of course his cursory examination will only suffice to warn the navigator from approaching them.

D'ENTRECASTEAUX or BOND'S REEF lies to the northward of the reefs which have just been alluded to. The French admiral thought that he had doubled the northern extremity when he made the small island (*Surprise Island*)—small, low, and covered with very bushy trees, and not more than 3 miles in circumference—which lies on its South end. It was in the same year, 1792, that Capt. Henry Bond made the first attempt of the great eastern passage to China, in the *Royal Admiral*, and discovered the North end of this detached portion of the reef. His journal of it runs thus :—"November 28th, 1792. At seven A.M., we could plainly see a long, low, woody island 4 leagues to the eastward of the breakers. The reef appeared from the point to be of considerable breadth, made up of islets, rocks, &c. It is the most dangerous shoal I ever beheld, and the water is so very smooth, owing no doubt to its eastern extent, that a ship might be on the reef presently, and almost with the best lookout."† This effect of the reef in quieting the long ocean swell to leeward is an indication of when this extremity is doubled.

Capt. D'Urville, in the *Astrolabe*, has fixed more precisely the northern end of this dangerous shoal. He passed within 4 miles of its North point, June 22nd, 1827, and found that it formed a bay 6 miles deep and 13 wide at this extremity.

* D'Entrecasteaux, tome i. p. 222, *et seq.*

† Oriental Navigator, p. 686.

The little *Huon Island*, low, wooded, and a mile in circuit, is the only part of this reef which rises above the water. At 2 miles to the West of this islet the reef runs almost directly North for the space of 9 miles, and terminates in a narrow point, on which are some bare rocks only a few feet above the water level. One of these, 15 or 20 feet high, is more remarkable than the others, and the reef does not extend more than a mile North of it. Numerous birds frequent these rocks and breakers. The positions of this and of D'Entrecasteaux Reef, as ascertained by D'Urville, are—the N.E. point, lat. $17^{\circ} 59' 7''$ S., lon. $162^{\circ} 55' 14''$; and the N.W. point of the reef, lat. $17^{\circ} 52' 40''$ S., lon. $162^{\circ} 41' 47''$ E.*

The CURRENT.—D'Urville found that he was set 34 miles in twenty-four hours to the N.N.W. by it when off the northern part—a warning to all commanders in this part of the Pacific.

The NORTH-EASTERN COAST is not very amply described. There are two French missions on it, thus described :—

MAHAMATE, the BALADE of D'Entrecasteaux, is safe, and the holding ground good; strong winds from the West only throw in any sea; the greater part of the reefs uncovered at low water. The church steeple of the French mission is the best mark for it, and is visible afar off. A cross erected on the *Observatory* or *Poudioué Islet* is also a good mark, but cannot be seen at a long distance. Again, beyond Hienguène there are no beaches visible behind the reefs, beside that to the West of Mahamate, you may be sure that you are at the latter instead of that of Ponebo. After having reached the pass of Mahamate you must not approach too near the larboard side, or you may be taken up by the coral banks to the North of Poudioué. Therefore you should not *serrer le vent* until you have brought the cross to the left of the village.† The *River Baiao* is accessible at half tide, and water is easily got at a rivulet flowing past the mission. High water, 7^h and $6^h 15'$; rise at springs, 4 feet, 6 inches; var. $11^{\circ} 5'$ E.‡

PORT PONEBO is somewhat difficult to make on account of the uniformity of the crest of the mountains; the Island of Hienguène, or the Cascades, will therefore, perhaps, be the best. The safest anchorage outside is the West point of the *Pouma Reef*, which is sheltered from the prevalent E.S.E. winds. There are no leading marks, therefore a vessel will do well to wait for low water, or be piloted in by two boats. Within it is small, but will let the largest ship lie in it for repairs. The river is accessible for boats as far as the French mission. High water, full and change, $6^h 15'$, rise 4 feet.

CAPE COLNETT was the first land of New Caledonia seen by Capt. Cook, and is in lat. $20^{\circ} 29'$ S., according to Cook; lon. $164^{\circ} 44'$, according to D'Entrecasteaux.

CAPE CORONATION is in lat. $22^{\circ} 2'$ S., lon. $167^{\circ} 47'$ E. There are some rocks off it. The coast here trends to the S.E., a few leagues to Cape Queen

* Voyage de *L'Astrolabe*, Histoire, tome iv. pp. 479-80.

† Cook stayed here in 1774, and observed an eclipse of the sun on the 6th of September. The small island where he fixed his astronomical instruments, called by him *Observatory Island*, is in lat. $20^{\circ} 17' 39''$ S., lon. $164^{\circ} 25'$ E. On D'Entrecasteaux's chart it is called *Bouguinoué*; and it was on this island that Capt. Huon, who commanded the French frigate *Recherche*, D'Entrecasteaux's consort, was buried during their stay here.

‡ Annales Hydrographique, 1849, p. 380.

Charlotte, before described. In the interval between these two points there is an excellent harbour, according to Mr. Morgan, of the missionary bark *John Williams*. It is a good place for heaving a vessel down, and possesses also the advantage of a good entrance, with abundance of fresh water.

LOYALTY ISLANDS

This group, it is said, was discovered by Capt. Butler, in the *Walpole*, in 1800, or, according to others, in the *Britannia*, in 1803. Whenever the real discovery was made, it is certain that nothing was known of them until D'Urville's examination of the group in 1827. Since that period, however, they have been frequented by trading vessels, and also have had some Roman Catholic missionaries established.

The Loyalty Islands, according to D'Urville, consist of three principal islands : *Britannia* (the Uea or Mingavi of the natives); *Chabrol* (Lifu or Wetsi); and *Halgan* (Onea or Hioe), the northernmost. Besides these there are numerous smaller groups around, and two considerable islands, Mari and Burrow's Islands, discovered in 1841 and 1842, to the southward.

D'Urville intended to have made a subsequent examination of their western sides, but did not; therefore his discovery, for discovery it must be taken, did not extend to the northward of lat. $21^{\circ} 37' S$. He came hither in a direct course from Erronan, making Cape Coster, on Britannia Island, his landfall, thereby not seeing the two southern islands hereafter first described. It must be stated, however, that the data of these islands do not rest on the same undoubted authority that the French examinations do.

BURROW'S ISLAND.—We know no more of this island than is contained in the newspaper notice of it following :—

"The *Pearl*, arrived in the Downs from China (September 12, 1842), reports, on her passage from Sydney to Manilla, having, on the 24th of September, discovered an island not laid down in the charts; it lies in lat. $21^{\circ} 59' S$, lon., by good chronometers, $168^{\circ} 30' E$; it is a fine-looking island, well wooded, with cocoa-nut trees close to the beach. At noon we were within 3 miles of the East point, which is in the middle of the island; off the point a reef projects about a mile to seaward; the island stretches in a N. by E. direction 20 to 25 miles. The captain, supposing it to be a new discovery, named it *Burrow's Island*. Two days after we made the Island Erromanga, which proved the chronometers to be correct. After we got to the northward of the N.E. point, we saw land stretching a great distance to the N.W.; it appeared to be detached from the first island, but night coming on we could not ascertain." *

MARI ISLAND is a new discovery by the sandal-wood vessels in 1841. The N.E. end of it is situated in lat. $21^{\circ} 21' S$, lon. $168^{\circ} 33' E$, and the S.W. end in lat. $21^{\circ} 37' S$, lon. $168^{\circ} 22' E$. It is about 20 miles in length from N.E. to S.W., and 10 miles in breadth. It has no harbours, but anchorage may be got near the shore in some places. The island is of coral formation, elevation about 250 feet, thickly wooded and quite level.

* The Times journal.

It is thickly inhabited by a wild race, of rather a small stature, whose manners and customs are similar to those of Lifu. Their food consists of yams, taro, cocoa-nuts, bananas, sugar-cane, sweet potatoes, and fish. The sandal-wood tree grows on this island.*

BRITANNIA, UEA, or MINGAVI ISLAND, is the first point made by D'Urville, June 15th, 1827. *Cape Coster* was the landfall. It is in lat. $21^{\circ} 25' 30''$ S., lon. $167^{\circ} 59' 56''$ E. The eastern side of the island was nearly North and South for the space of 12 miles, a steep cliff, with a narrow beach, or frequently without this. In the southern part cocoa-nut trees and pines were seen. There were no surrounding reefs.

Cape Roussin is separated from Cape Coster by an extensive bay, and is in lat. $21^{\circ} 21' 45''$, lon. $167^{\circ} 48' 32''$ E. The land is throughout of the same character; the whitish cliffs inland, which characterize the hills, giving them the appearance of castles or high walls, and indicating a calcareous or madreporic origin. The northern side of the island is a deep bay, having *Cape Mackau* at its West extremity. Cape Coster is a peninsula, surrounded by breakers at a short distance. Off Cape Mackau is a small inhabited island, called by D'Urville *Molard Island*. It is only about 3 miles in circuit. On one of its points were some curious pines in the form of columns.† This is the amount of information given by D'Urville. He did not land, nor examine more of it than here stated. His account is therefore meagre, but the ensuing later description will fill the vacancy :—

The Britannia Islands, named Uea by the natives, consist of one large island (30 miles in length in a N.N.E. to S.S.W. direction), and a number of smaller ones to the westward of it, connected by coral reefs joining on Uea, with three good ship passages leading into a large and beautiful bay, having regular soundings all over it. Its formation is similar to some of the lagoon islands near the equator. The south-eastern part of Uea presents an iron-bound shore, with perpendicular cliffs, and no soundings within 100 yards of the breakers; from that round the N.E. and North parts of the island the shore is generally rocky. Boats may land in some places on the North and N.E. parts in fine weather. The West side of the island, fronting the anchorage, is low land, thickly studded with cocoa-nut trees, and a white sandy beach runs along its whole margin, giving the shore a beautiful appearance from the lagoon. The *Juno's* entrance is one-eighth of a mile wide, and has not less than 6 fathoms in any part of it. The *Bull's* entrance is rather wider, and has 12 fathoms in mid-channel; this entrance may easily be known to a stranger by the island forming the East side having a clump of tall pine trees on it. This is the only island near the passage which has any timber on it, the others being merely low rocky islets, covered with grass and brushwood. I should decidedly prefer entering by the *Bull's* channel.

If bound to the anchorage of King Whiningay's village, a direct course should be steered, if the wind will allow, taking care not to come under 5 fathoms

* Nautical Magazine, October, 1848, p. 515. In 1844 the natives cut off a Sydney vessel, the *Sisters*, and murdered all the crew; and in 1841 a boat's crew were also cut off.

† Voyage de *L'Astrolabe*, Histoire, tome iv. pp. 463—465.

until near the place you intend to anchor, as many sunken rocks exist in-shore of that line of soundings, which cannot be discerned even from the mast-head ; when they can be seen they appear to have a dark-brown colour. The natives generally have fish-pots set alongside the rocks, with small black buoys ; the rocks can mostly be avoided. The course from the Bull's entrance to the anchorage off Whiningay's village at Fitzaway is S.E. by S. by compass ; this course will take a vessel clear of all dangers ; when she shoals her water to 4 fathoms she will then be abreast of the king's village, and about $1\frac{1}{2}$ miles from the shore, where she may anchor. The palisades of the fortification around the chief Koumah's village will be seen near the beach, and fronting the cocoa-nut trees. The two villages are about a mile apart, with few or no cocoa-nut trees betwixt them.

From Whiningay's village to the South point of Uea is about 5 miles ; a boat harbour is formed between this point and the next island to it, fronting the small *Island of Wassaw*. The next island to the westward of Wassaw is of large extent, and inhabited by a chief and his dependants, who, in consequence of being married to the daughter of a king, has much power over the natives, and ranks next to Koumah. This chief is named Boumulli. All the other islands of this group have no permanent inhabitants, but are merely visited occasionally by the natives when they go on fishing excursions.

The best entrance into the lagoon is on the West part of the reef. This passage is 4 miles wide, and clear of all hidden dangers. The land of Uea cannot be seen until a vessel gets some miles to the eastward of the entrance. They did not try for soundings when beating in this channel in the brig *Naiad*, but it was thought that no soundings are to be got in the lagoon until the land of Uea is visible from the deck. A vessel may anchor in any part of the lagoon within sight of the land, as the soundings are very regular, on a bottom of fine white sand. With westerly winds a short sea sets into the lagoon, which renders it difficult to communicate with the shore ; but these winds are of short duration, and only happen from October till April. A vessel anchoring here in these months should ride with a long scope of cable, as the holding ground is not very good.

The Island of Uea is of coral formation, elevated on the S.E. part about 250 feet, and quite level on the top ; the other parts of the island are not quite so high, and the whole is thickly wooded. From the East side to the centre of the island the ground is very rocky and destitute of soil ; but on the West side, around, and a little inland from the villages, the soil is good, and capable of producing every variety of tropical fruits and vegetables, and is well cultivated. These plantations produce beautiful taro, sweet potatoes, bananas, and sugar-cane ; but yams are not much cultivated.

Fresh water can be got in several places near the beach by digging wells in the sand, but there are neither running streams nor springs on the island.

The prevailing winds are from S.E., but from October until April westerly winds are frequently experienced, and gales happen sometimes in these months ; they generally commence at N.E., haul round to North and N.W., from whence they blow hardest, then round to S.W. and moderate. Very little rain falls during the year.

Whiningay's village was made to be lat. $20^{\circ} 34' S.$, and lon. $166^{\circ} 34' E.$ It is high water on full and change of the moon at 6^h, greatest rise and fall of the tide 6 feet. At neaps, there is only one tide in twenty-four hours, and this is generally in the night; the water does not rise then above 2 feet.

The climate of these islands is salubrious, and well adapted to a European constitution. The warmest months are in the summer season, from October till March, and during the rest of the year the weather is cool and agreeable. Earthquakes are frequently experienced during summer, and some of them are sufficiently severe to overthrow a stone house, but the shock seldom lasts more than two minutes, and the natives exhibit no fear on account of them.

The natives appear to be tolerably free from diseases, and those which came under observation were colds, elephantiasis, hydrocele, and rheumatism; the latter disease appears to be the most prevalent, and attacks them in the bone of the leg, which they relieve by making an incision in the bone with a shell over the part affected.

Although otherwise cruel, these people are kind and affectionate to their children, and seldom punish them even for the most insolent or passionate behaviour.

The natives of Uea are cannibals, and invariably eat the bodies of their enemies slain in battle with as much relish and satisfaction as any of their neighbours. When at war, women are often cut off (by small parties of the enemy) when fishing on the reefs, and their bodies carried home to administer to their cannibal appetites.

In regard to the population, it was found difficult to obtain correct information; but it was estimated to be about 4,000 souls.*

This account of the island is circumstantial, and appears faithful.

To the northward of it, besides Molard Island, previously alluded to, are three other small islands, named by the French *Hamelin*, *Lainé*, and *Vauvilliers*. To the East of these is a fourth, *Boucher Isle*, 8 or 10 miles in circumference. D'Urville passed between them.

CHABROL, LIFU (or *Wersr*), is the island next in order to the N.W. Its S.E. point, *Cape Pines* (Cap des Pins), is in lat. $21^{\circ} 4' 30'' S.$, lon. $167^{\circ} 20' 3'' E.$ This part of the island is much higher, hilly, and very much better wooded than Britannia. The cape is a projecting promontory, in the form of a peninsula, crowned with a mass of pine trees; hence its name. At 5 or 6 miles N.E. of it, and beyond *Point Daussy*, is a large and deep bay, *Chateaubriand Bay*, which without doubt would offer good shelter against S.W. winds, but must be completely exposed to those from the East, or the prevalent ones. At *Cape Bernardin*, the N.E. point, the coast assumes a new direction, to the westward, and is altogether perpendicular and wild looking, only covered with some bushes and shrubs, and a few cocoa-nut trees in the ravines. *Cape Escarpé*, the North point, is in lat. $20^{\circ} 40' 25''$, lon. $167^{\circ} 10' 4'' E.$ To the West of it, 7 miles, and $2\frac{1}{2}$ off the land, there is a dangerous reef, a mile in length and half a mile

* Nautical Magazine, November, 1848, pp. 570—572.

broad. From all appearances there was a passage inside it, though the water was discoloured. From this part a spacious bay was apparently disclosed on the western side, between two well-marked points, *Point Aimé-Martin* and *Point Lefèvre*, which would afford good shelter against the East winds.*

We are again indebted to the same commander who has described the Britannia Islands for the following.

Lifu or Chabrol is about 37 miles in length from North to South, and varying in breadth from 10 to 20 miles. It has no harbour, but there is a large bay on the N.W. part, 12 miles wide at the entrance, and about 10 miles in depth, with very indifferent anchorage at the head of it, near the shore, among coral patches, and on a bottom of coral and sand. It is safe during the S.E. monsoon, but ships should always be ready for slipping, in case of an attack, or the wind setting in. There are no soundings to be got in the bay, until within 500 yards of the shore, where is a coral bank, studded with dangerous coral patches, and from 10 to 20 fathoms water in the clear places, where a vessel may anchor. The other parts of the island present an iron-bound shore with perpendicular cliffs, and no soundings within 100 yards of the breakers. It is of coral formation. Its elevation is about 250 feet, quite level on the top, and thickly wooded. There is a coral reef in the mouth of the bay, about 3 miles from the South head, which can always be avoided by having a careful person at the mast-head, otherwise the bay is clear. Another dangerous reef lies off the North end of Lifu; it bears from the N.W. point of the island N.N.W., distant 8 miles, and the sea always breaks on it.

The Island of Lifu, although thickly clothed with timber, will bear no comparison with the Isle of Pines, off New Caledonia. With respect to its soil, the only good ground to be found is on small spots of low lands near the shore where the villages are, and on which are several beautiful groves of cocoa-nut trees; also yam, taro, banana, and sugar-cane plantations; these cultivated spots produce more than sufficient to supply the wants of the inhabitants. Behind these plantations, in some places high coral cliffs arise so abruptly that the ascent to the top of them is extremely difficult. On the N.E. part of the island the cliffs rise perpendicularly from the sea, rendering it impossible to land, and the neighbourhood is uninhabited. The greater portion of the interior of the island is destitute of soil, and similar to the low coral land at the Isle of Pines.

The natives of Lifu are about the middle size, and exhibit much variety of figure. Their complexion is between that of the black and copper-coloured races. Their hair is frizzled, and besides the long bushy beards and whiskers worn by many, they have a great quantity of hair on their bodies. Their eyes are black and penetrating, and although equally savage with the Isle of Pines natives, their features exhibit rather a milder and more pleasing appearance.

The males go entirely naked; and the only dress worn by the females is a fringe about three inches wide tied round the body. Circumcision is not practised here,

* M. Dutailis says that he was informed by Lieutenant-Commander Marceau that there is but one anchorage, that of *Gaiteka*; unfortunately it is open to the West, and can only be considered safe during the season when easterly winds prevail. There is another point where a ship may find temporary anchorage, at *Gala*, in the northern part of the island; the rest of the coast is steep-to.—*Annales Hydrographique*, 1849-50, vol. i. pp. 160-1.

as at the Isle of Pines. Polygamy is permitted among them, and promiscuous intercourse allowed.

Thenatives of Lifu are very much addicted to stealing, are treacherous and cruel in the extreme, and generally speaking great cowards. They are also much given to lying, and seldom speak the truth even among themselves. No confidence should be put in their professions. The eating of human flesh is practised at this island from habit and taste, not merely from revenge, as was at first supposed, but from the mere pleasure of eating human flesh as a food. Their fondness for it is such, that when a portion has been sent some distance to their friends as a present, the gift is eaten even if decomposition have begun before it is received.

The inhabitants of Lifu are divided into two tribes, who are independent, and often hostile to each other. They are classed into kings, chiefs, landholders, and slaves. The king of the North part of the island is named Gweeath, and that of the southern tribe Bulah, who is quite blind.

HALGAN, ONEA, or HIVE ISLAND, is the northernmost of the large islands of the Loyalty Group. D'Urville only examined its eastern and northern sides, and so did not ascertain its real character—an upheaved coral island. *Point St. Hilaire* is the S.E. point made by D'Urville; to the North of it it forms a large bay, open to the East, limited to the North by *Cape Rossel*, named after D'Entrecasteaux's companion, and on which were seen, here and there, some tufts of cocoa-nut and pine trees. Beyond this, to the westward, the coast is formed by a chain of low islets, flat at the summit, and with perpendicular sides, covered with tufts of verdure, and apparently connected by a common submarine rocky base. About fifteen of them were counted. These were called the *Pleiades* by D'Urville. Cape Rossel is in lat. $20^{\circ} 33' 33''$ S., and lon. $166^{\circ} 26' 14''$ E., according to D'Urville. Subsequent examinations have determined the real character of the island.

It forms part of a group enclosing an interior sea of 15 miles in diameter, and the bottom of which, at a mile from the land, is at from $3\frac{1}{2}$ to 13 fathoms.

Halgan or Onea Island occupies about a third of the enclosure of this basin; the other two-thirds are formed by a chain of reefs, on which are scattered some small islands; the northern are known by the name of the *Pleiades*, and were seen by Dumont d'Urville as above stated.

Up to the present time seven passages for vessels are known, of which three are principal.

That of the North, which is half a mile wide by 2 cables' length long, lies to the West of *Aguieu Island*. The current in it is strong, and the depth shallow.

Aguieu Island is recognisable by three clumps of Norfolk Island pines, very distinct from each other, and this part is the only place where they grow.

On *Halgan Island* some French missionaries were to be established; the ship *L'Arche d'Alliance* having left with them from Sydney at the end of April, 1848.*

The BEAUPRE' ISLANDS were discovered and named by D'Entrecasteaux, after the celebrated hydrographer. D'Urville's position of them is lat. $20^{\circ} 18' 0''$,

* M. Dutailis, *Annales Hydrographique*, vol. i. pp. 160-1.

lon. $165^{\circ} 59'$ E. (N.W. point of the reef). They consist of three small low islands, covered with cocoa-nut trees, and surrounded by a coral reef, which extends from the islands some distance to the N.W. and North. The largest island is at present inhabited by natives of Britannia Island.

The ASTROLABE REEFS nearly proved fatal to D'Urville's ship, as Beauteemps Beaupré Islands had to D'Entrecasteaux's, and Vanikoro really did to La Pérouse, a singular coincidence as to locality, and a great evidence of the danger of the navigation in these parts. The reefs in question are more to be dreaded from their distance from the land, being 30 miles from Beaupré Islands, and 60 miles from the nearest point of New Caledonia.

The southernmost of them may be about 4 or 5 miles from North to South, but its South end was not seen. At the North extremity is a sandy islet, nearly level with the water, which may in course of time become covered with vegetation. The northernmost of these reefs is 5 leagues distant from the other, and 6 or 7 miles from North to South. D'Urville thought that they might be connected by a chain more to the S.W., so as to form a horse-shoe shaped reef. This supposition has been verified by the discovery, in October, 1842, of a dangerous coral reef, one mile in extent, in lat. $19^{\circ} 55'$ S., lon. $165^{\circ} 25'$ E. The North point of the Astrolabe Reefs is in lat. $19^{\circ} 40' 20''$, lon. $165^{\circ} 26' 24''$ E.*

SIMPSON REEF is a danger lying between the Loyalty Islands and New Caledonia, and was discovered by Capt. T. B. Simpson, in 1846. It is of large extent; the position he assigns to it is lat. $21^{\circ} 30'$ S., lon. $166^{\circ} 50'$ E.

PETRIE REEF, in lat. $18^{\circ} 35'$, lon. $164^{\circ} 22'$ (N.E. extreme), although not connected with the foregoing, may be taken as part of the same chain of dangers. It was discovered, March 16th, 1835, by Lieutenant Peter Petrie, R.N., in the bark *Betsy* (hence it is sometimes called Betsy Reef). No part appeared above water, but just awash, extending 8 miles S.E. and N.W. The East side is steep-to; but the western side seemed to have shallow water running off nearly 8 miles from the N.W. end. In moderate weather the breakers give but little warning.†

VASQUEZ ISLAND was discovered by Maurelle, March 27, 1781. He states that it is 4 leagues from N. to S. He places it $7^{\circ} 19'$ E. of Pylstaart's Island, which (though doubtful) will give its longitude as $177^{\circ} 41'$ E. Its latitude Maurelle gives as $24^{\circ} 44'$ S. The island has not been seen since its first discovery by Maurelle, whose longitudes being so much in error, the position may be wrongly stated. Added to this, Admiral Krusenstern, in discussing its position, has made the error of adding, instead of subtracting, the correction. The island has appeared in a very different position to that originally assigned to it. It may consequently yet be found 7° or 8° West of its place on the charts.‡

ROSARETTA SHOAL.—This is a dangerous shoal, on which the *Rosaretta*, a prize belonging to H.M.S. *Cornwallis*, was wrecked on her passage from Pisco,

* *Voyage de L'Astrolabe*, vol. iv. pp. 476-7; *Nautical Magazine*, 1848, p. 514.

† *Nautical Magazine*, No. 56, 1836, p. 625.

‡ See Krusenstern, vol. i. pp. 26-7.

in Peru, to Port Jackson in 1807. It is composed of hard, coarse sand and coral. From the distressed situation of Mr. Garland, the prize-master, its extent could not be ascertained. The position first assigned to it was lat. $30^{\circ} 10' S.$, lon. $173^{\circ} 45' E.$ * Another reef that broke, it is stated in Arrowsmith's chart, was discovered in 1811, in lat. $30^{\circ} 25'$, and lon. $180^{\circ} 45' E.$, or 5° more to the East. With regard to the latter, it does not exist in this situation, for it was unsuccessfully sought for by Capt. Wilkes.†

A BANK of sand, small black stones, and corals, was sounded and dredged on by Sir James Ross, in lat. $33^{\circ} 32' S.$, lon. $167^{\circ} 40' E.$, about 220 miles N. $80^{\circ} W.$ from the Three Kings. The depth in it was *four hundred fathoms*, a singular fact.—(August 11th, 1841.)‡

NORFOLK ISLAND was discovered October 10th, 1774, by Capt. Cook. It forms a portion of the British colony of New South Wales, and has done so from its earliest date as a settlement.

It is a beautiful island; all early visitors speak loudly in its praises. It was said of Norfolk Island, in 1798, that it had arrived at a state yet more flourishing than Port Jackson, "the air being more soft, and the soil inexpressively productive. It is a perfect image of paradise. Our officers and their ladies, while they never regret their absence from Old England, were very sensibly affected at their departure from their insular garden, and at their banishment to Sydney."

It was then abandoned by the government, but subsequently was again formed into a penal settlement, for doubly-convicted and the more important felons from the colony of New South Wales. Thus its new population forms a frightful contrast to the natural beauties of the place.

Norfolk Island, says an "officer on the spot" in 1847, is by nature a paradise, endowed with the choicest gifts of climate, scenery, and vegetable productions; by art, society, or policy, a hell, disfigured by crime, loathsome vice, and misery.§ This sad picture is allowed by all to be too true.

Other authorities must be sought for the history of this unique colony.

The ensuing brief remarks are gathered from Capt. Maconochie's Report;|| the Survey in 1840, published by Mr. John Arrowsmith; and the remarks in the United Service Journal, 1847 and 1849; the last of which will be found very interesting.

In 1829 Colonel Morrisett was civil superintendent. During the next five years it is said that outrages of every description were of frequent occurrence, and many of the South Sea Islands have to deplore the escapes which then were effected by the convicts. In 1834 Major Anderson relieved Colonel Morrisett; and after five years Major Bunbury and Major Ryan held the office for a year; and in March, 1840, the respected Capt. Maconochie, R.N., K.H., well known

* Purdy's Tables, p. 92.

† Narrative of the United States' Exploring Expedition, vol. iii. p. 5.

‡ Sir James Ross, Voyage of the *Erebus* and *Terror*, vol. ii. p. 54.

§ Twelve Months on Norfolk Island, United Service Journal, 1847 and 1849.

|| Report of British Association, Transactions, 1844, pp. 57-8.

in connexion with the London Royal Geographical Society, undertook the office of introducing a system of management of the convicts. This system has been so fiercely discussed, that it will be needless to enter into details. This lasted till February, 1844, when Capt. Maconochie was relieved as superintendent by Major Childs.

The *group*, of which Norfolk Island is the principal, is 900 miles E.N.E. from Sydney, and 1,350 miles N.E. from Cape Pillar, in Van Diemen's Land. Norfolk and Philip Islands, the largest of the group, are about 3 miles distant from each other; and about a dozen others, the Nepean and Bird Islands, are little more than dry rocks distributed among them.

NORFOLK ISLAND is not quite 5 miles long, with a medium breadth of about $2\frac{1}{2}$ miles, and is said to be 8,960 acres; its greatest elevation is the double summit of Mount Pitt, 1,050 feet high. It stands on the N.W. corner of the island. The ascent to it is in parts very steep, but practicable for a horse. At the summit is a flagstaff and semaphore, with a hut formerly occupied by the lookout men, but in recent times abandoned, and in a most dilapidated state. The entire island, with the exception of the settlement, may be seen from hence. Its sea front is high and precipitous, presenting cliffs of 200 and 250 feet in height; and the small streams which occupy the ravines in winter fall in cascades, 30 or 50 feet high, into the sea.

There are but two or three spots where landing is practicable, one at the settlement, another at *Cascade*, on the North side of the island. Even at the settlement the danger is often very great, owing to the "Bar," or reef of rocks, the extremity of which boats have to round in order to reach a rude wharf. The accomplishment of this feat is perilous whenever there is a sea or ground swell rolling in from the S.W. The position of this entrance over the bar is shown by two trees on Nepean Island in one.

Sydney Bay, between Nepean Island and Point Ross, lies at the South side of the island, and the SETTLEMENT lies at the head of it. As may be supposed, this is only adapted to the circumstances of the island, and does not invite the passing stranger. It is sometimes called *Kiwosron*.

Among the buildings the capacious jail and barracks are distinguished, the latter erected in 1835. These, with the government house, may be said to be the only ornamental buildings in the settlement. The latter is a spacious dwelling, situated advantageously on a gentle eminence, rising about 50 feet above the adjoining level. Nearer the shore extend the prisoners' barracks and hospital, workshops, and huts for the overseers. A solitary windmill on a rocky point completes the list of buildings on the settlement.

Besides this locality there are two other stations for convicts, one at Longridge, about $1\frac{1}{2}$ miles distant, and another at *Cascade*, on the North side. This latter has a neat and cheerful appearance compared with the settlement.

PHILIP ISLAND, named in honour of Arthur Philip, first governor of New South Wales, is about $1\frac{1}{2}$ miles long, with an average breadth of three-fourths of a mile; it bears S. 20° E. by compass, $3\frac{1}{2}$ miles from the landing-place at Sydney Bay. Its most elevated part, a remarkable peak on its South side, is probably 200 or 300 feet less than that of Norfolk Island. It is everywhere precipitous,

furrowed by deep channels, and densely wooded, though the timber is small and of little value. At half a mile to the South of it there is a rock always above water.

Nepean Island is in lat. $29^{\circ} 2' S.$, lon. $167^{\circ} 48' E.$ This island lies half a mile off the land, and for a larger portion of the passage between there are a number of detached rocky banks. The channel is close to the reefs on the North side, and has a depth of 4 and 5 fathoms. N.E. by N. of Nepean Island, for a considerable distance, is a bank of sand and mud.

Nepean Island rises to the height of 50 feet; it is a quarter of a mile long, and of a horse-shoe shape, open to the East. No water has been found in it, and its vegetation has within the last few years almost disappeared, owing to a colony of rabbits, which, having destroyed everything edible, have now themselves perished. It is reported that, in 1793, this island was only a boat's length from Norfolk Island, but that, in 1797, two severe earthquake shocks were experienced, by the second of which the nearer point of Nepean Island was submerged, and the channel altered to its present form.

Point Ross is the southernmost point of Norfolk Island, and the S.W. point of Sydney Bay; to the East of it, as far as the bottom of the bay, the rocky banks extend a long distance off the shore, and the sea breaks all across them in a S.W. gale, or heavy surf.

The tide flows, full and change, at $7\frac{1}{2}^h$, and rises from 5 to 7 feet. The flood runs to the S.W. by S., and ebb to the N.E. by N. The tide makes two hours sooner on the Norfolk Island shore than in the stream and over towards Philip Island, and is sometimes irregular, but in general equal. Ebbs and flows regularly by the shore, six hours each tide; * variation, $11^{\circ} 18' E.$, dip, $54^{\circ} 53'.$

ELIZABETH REEF, called also SERINGAPATAM REEF, was discovered by the ships *Claudine* and *Marquis of Hastings*, May 16th, 1820. It appeared to be of a quadrangular form, about 3 miles in circuit, with deep water in the centre, the edges of which, with the exception of a few rocks like Negro heads, are covered, and the sea runs high over them. The East side of the reef extends N.N.E. and S.S.W. about a mile; but the greatest extent appeared to be from W.N.W. to E.S.E. The position of this reef, according to Capt. Horsburgh, from whom the preceding is quoted, is lat. $30^{\circ} 5' S.$, lon. $159^{\circ} 0' E.$ †

ELIZA REEF.—The *Eliza*, of London, was wrecked on a reef in 1831, lat. $29^{\circ} 30' S.$, lon. $158^{\circ} 30' E.$ By the observations of the *Fairy* cutter, sent from Sydney to examine the wreck, it may be identical with Middleton Reef.

MIDDLETON ISLAND and SHOAL.—Capt. Flinders has placed this island in lat. $27^{\circ} 58' S.$, lon. $160^{\circ} 31' E.$ In Mr. Purdy's Tables of Positions it is lon. $159^{\circ} 30'.$ The position is open to some doubt, because Capt. Flinders, a short time before his decease, informed Mr. Purdy that he could not say with any certainty where it should be placed.‡ The island is very high, with a remarkable peak.

* Purdy's Tables, p. 92.

† Horsburgh, vol. II. p. 668.

‡ Purdy's Tables to Oriental Navigator, p. 87.

Middleton Shoal is placed by Flinders in lat. $29^{\circ} 14' S.$, lon. $158^{\circ} 53' E.$ An extensive reef, about 3 leagues in length, was seen in July, 1815, by the *Indefatigable*, supposed to be Middleton Reef; but their chronometer being incorrect, its longitude was not ascertained.*

An ISLAND is placed by Lieutenant Raper in lat. $31^{\circ} 19' S.$, lon. $160^{\circ} 42' E.$; position doubtful.

FAVORITE SHOAL, also doubtful, in lat. $26^{\circ} 6' S.$, lon. $160^{\circ} 0' E.$

A ROCK in lat. $24^{\circ} 0' S.$, lon. $160^{\circ} 15' E.$

CAPEL BANK, discovered by H.M.S. *Hyacinth*, June 8, 1835. The first soundings were in 37, 38, and 35 fathoms, over an area of considerable extent. The boats sailed in a N.N.W. direction for $2\frac{1}{2}$ miles, and sounded in 34 and 32 fathoms, which was the least water found; bottom of red and white coral. The extent was not ascertained. The first soundings on the N.E. side, in lat. $25^{\circ} 14' 51'' S.$, lon. $159^{\circ} 18' 15'' E.$ It was named after the commander-in-chief †

The space comprised between the western shore of New Caledonia and that of Australia, and South of the Solomon Islands and the Louisiade Archipelago, is bestrewn with an infinity of dangers. To this area, from its character, Flinders has proposed the very appropriate title of the CORAL SEA. As the navigation of this part of the Pacific more immediately refers to that between New South Wales and Torres Strait, &c., we will include all necessary notices of it in an ensuing section.

CHAPTER XXIII.

LOW ARCHIPELAGO, OR PAAMUTO GROUP.

THIS vast collection of coral islands, one of the wonders of the Pacific, extends over 16 degrees of longitude, without taking into consideration the detached islands to the S.E. of it. They are all of them of similar character, and exhibit very great sameness in their features. When they are seen at a distance, which is not great, on account of their lowness, the aspect is one of surpassing beauty, if the dry part of the island or belt is sufficiently covered with trees: but much of this beauty is dispelled on a nearer approach, as the vegetation is usually found to be scanty and wiry. Their ordinary and distinctive features will be sufficiently adverted to in the detailed descriptions ensuing.

* Horsburgh, vol. ii. p. 668.

† Nautical Magazine, February, 1836, p. 65.

The names applied to the group are characteristic. It is sometimes called the *Dangerous Archipelago* (first so by Bougainville), a character much more formidable in former years, when knowledge was much more imperfect. The native name, which is variously spelt, *Paamuto* (FitzRoy), *Paumotu* (Wilkes), or *Pomotou* (Vincendon-Dumoulin), signifies "a cloud of islands,"—an expressive term.

The form and formation of a coral island are among the most interesting phenomena in nature, and of late have received much attention. The remarks that have been made by various observers cannot here be detailed. Some of them will be found in the Appendix to this volume, and to that the reader is referred.

From the extent of the archipelago, and the character of the islands, they have been discovered by various navigators, whose voyages have extended over a very long series of years. Even now it may be that we have not an entire knowledge of them, although late explorations have done much more than those preceding them.

The first who gave any notice of their existence was Quiros, who, in 1606, saw several islands on the South and North side of the group; all of which have not yet been satisfactorily identified. Le Maire and Schouten, in 1616, discovered several islands in the North part; and Roggewein, also in the North, passed here in 1722. Subsequently to this, Byron (1765), Wallis and Carteret (1767), Cook (1769, 1773, 1774), Bougainville (1763), Boenecheo, captain of the Spanish frigate *Sta. Maria Magdalena* (1772—1774), Edwards (1791), Bligh (1792), Wilson (1797), Turnbull, in the *Margaret* (1803), have all given us some additions to the history of discovery. More exact observations were then made by Kotzebue (1816), Bellingshausen (1819), and Duperrey (1823). Beechey (1826), FitzRoy (1835), and Wilkes (1841), have given us more accurate details. All these will be hereafter noticed.

The number of separate islands or groups is between eighty and ninety, and the population is estimated by Capt. Wilkes, with what accuracy we have no means of judging, at 10,000, of which 5,000 are on Anhar or Chain Island, and 2,000 on the Gambier Islands. The *first* of these has (or had) the nominal sway over all the western part of the archipelago: on the latter there has been for many years a Roman Catholic mission established, the success of which, there is very little doubt, led to the great change in the affairs of Tahiti.

At present the islands acknowledge the supremacy of Tahiti, and the endeavours of the missionaries have greatly ameliorated the character of the natives in that part of the group to the westward of lon. 145° particularly.

The natives are not all of the same origin. Some of them resemble the Feejeeans in the darkness of their skins, their figure, and their ferocity. Others have the more gentle character of the Tahitians; but it is acknowledged that they have a more warlike disposition than the latter, and for this reason Pomare I. kept a body-guard of them in preference to his own subjects. They apparently speak a different dialect of the great Polynesian language to that of Tahiti, but it is soon acquired by others. The greater part of the natives are reputed to be an honest and trustworthy race.

They navigate among the different groups; but the most venturesome of the islanders are those on Anhar or Chain Island. These frequently visit Tahiti, and many other groups, for the purpose of collecting articles of trade, as tortoise-

shell and pearl oysters. Their vessels are double canoes, about 35 feet long, and 4½ feet wide, connected by a strong framework, on which is placed a deck, and sometimes a temporary hut. They are built of wood sewn together, and hoist two large mat sails on separate masts. They are strong, and have no difficulty in navigating; but sometimes they are blown away in storms, which they say come from the N.W. They are thus frequently obliged to take refuge on strange islands.

The islands would generally be considered to lie within the verge of the regular trade wind, which is observed to blow with considerable regularity throughout the breadth of the Pacific; but from some cause, not satisfactorily accounted for, the land, small in area and unimportant in height, has such an influence, that it interrupts altogether the regularity of its eastern direction. "Not only does the easterly wind often fail among them, but heavy squalls come from the opposite direction, and more frequently by night than by day. This is especially the case from November to March."—(FitzRoy, p. 506.) From this cause it is much better, in the case when their neighbourhood lies in the track of a ship across the ocean, to avoid the Low Archipelago, than to get entangled among its numerous islands and reefs, all requiring the greatest watchfulness, and when the usual facilities for a direct course may fail.

The effect of the prevalent south-westerly gales in the high latitudes, in sending in a heavy sea, which is felt many hundred miles from the place whence it proceeds, occasions a serious obstacle to landing upon the low islands, by rolling in upon the shore in an opposite direction to the trade wind, and thereby making it more dangerous to land upon the lee side of the island than on the other.*

In most of the entrances to harbours in the Lagoon Islands there is a strong current of tide, which sets in and out alternately about six hours each way. The tide rises nearly 2, or at most 3, feet. It is high water about one, on the days of full and new moon, among the western groups of islands; and from half an hour to an hour later among those which lie towards the S.E. The currents, which do not appear to be caused by tide, are irregular; and as yet too little is known of their usual direction to enable any one to say more than that, during settled weather and a steady trade wind (south-easterly), the surface waters in general move westward, from 5 to 25 miles a day; and that in the rainy season, from October to March, when westerly winds, squalls, and rain are frequent, the currents vary most, and occasionally set eastward, at the rate of from half a mile to 2 miles an hour.

Numerous instances are upon record of canoes being drifted out of their course, even several hundred miles, by currents and westerly winds; few narratives of voyages in the Pacific are without a notice of them: and they materially assist

* Beechey, vol. i. p. 145. Capt. Sir Edward Belcher points out a possible source of mistake in announcing the existence of a reef or shoal. During the period of the N.W. swell, which exceeded anything he had before seen in the Pacific, the wind backed off to W.S.W. in rain squalls. "In one of these I observed the sunbeams on the horizon, through the surrounding rains, shining on the crests of the swell, resembling very heavy rollers; and although I instantly perceived the cause, and named it, yet having riveted my attention for some time, I could hardly bring myself to believe they were not heavy rollers, probably from hearing those around me confident that they were so. Upon similar grounds, doubtless, many of the reefs and islands in these seas have been reported."—*Voyage of the Sulphur*, vol. i. p. 351.

in explaining how remote, and perhaps very small islands, may have been peopled from the West against the direction of the generally prevalent wind.*

There are but few inducements for commercial enterprise in the Low Archipelago. Its artificial productions are necessarily very limited, and only supply the personal wants of the inhabitants. The very small area of their islands, though abundantly fertile, allows little scope for cultivation. From the recent character of their soil, too, the natural productions are comprised within very narrow limits: cocoa-nuts do not grow on all, and the want of fresh water prevents many from affording the means of subsistence to a scanty people.† Almost the only article of commerce for which they have been frequented of late years, and this may be by this time exhausted, is the pearl oyster-shell, of which considerable quantities have been procured. In the accounts of portions of the archipelago we have stated where it is or has been found, chiefly from the information of M. Mauruc. The natives dive for these shells in their lagoons, and receive but a small recompense from the shipping traders, who are chiefly foreigners residing at Tahiti. One evil has followed this commerce, the demoralizing effects of spirits. It is to be hoped that this and other bad habits, too frequently introduced by the white visitors, may be abolished, and that civilization may advance and promote peace among the different islanders, and cause protection to be given to the unfortunate mariner who may be cast away on them.

Following the usual plan, we commence our descriptions with the south-eastern islands, and proceed onward to the N.W.

DUCIE ISLAND was discovered by Capt. Edwards in 1791. It is in lat. $24^{\circ} 40' 20''$, lon. $124^{\circ} 48'$. It is of coral formation, of an oval form, with a lagoon in the interior, partly enclosed by trees, and partly by low coral flats, scarcely above the water's edge. The height of the soil above the island is about 12 feet, and the trees rise 14 more, making its greatest elevation 26 feet from the level of the sea. The lagoon appears to be deep, and has an entrance into it for a boat, when the water is sufficiently smooth to admit of passing over the bar. It is situated at the S.E. extremity, to the right of two eminences that have the appearance of sand-hills. The island lies in a N.E. and S.W. direction; it is $1\frac{1}{2}$ miles long and 1 mile wide. No living things, birds excepted, were seen upon the island; but its environs appeared to abound in fish, and sharks were very numerous. The water is so clear over the coral, that the bottom can be seen when no soundings can be had with 30 fathoms of line; in 24 fathoms the shape of the rocks at the bottom was clearly distinguished. The corallines were of various colours, principally white, sulphur, and lilac, and formed into all manner of shapes, giving a lively and variegated appearance to the bottom; but they soon lost their colour after being detached.

* FitzRoy, *Voyage of the Adventure and Beagle*, Appendix, p. 193.

† One singular feature in the islands is the immense quantities of the common house-fly which are found in all *inhabited* islands; for on Horden Island, which is without inhabitants, there were none. Their numbers are incredible, and extremely annoying. It has been thought that they have been introduced by the visits of ships: but one of the earliest discoveries was Vlieggen (or *Fly*) Island, by William Schouten, on April 18th, 1616. His boat's crew, on landing, found themselves attacked by millions of a sort of black fly, in such prodigious swarms, that the men returned covered with them from head to foot; their very boat and oars were also covered. This dreadful plague of flies lasted three or four days on board the ship after they quitted the island.

By the soundings round this little island it appeared for a certain distance to take the shape of a truncated cone, having its base downwards. The north-eastern and south-western extremities are furnished with points, which project under water with less inclination than the sides of the island, and break the sea before it can reach the barrier to the little lagoon formed within. It is singular that these buttresses are opposed to the only two quarters whence their structure has to apprehend danger; that on the N.E. from the constant action of the trade wind, and that on the other extremity, from the long, rolling swell from the S.W., so prevalent in these latitudes; and it is worthy of observation, that this barrier, which has the most powerful enemy to oppose, is carried out much farther, and with less abruptness than the other.

The sand mounds raised upon the barrier are confined to the eastern and north-western sides of the lagoon, the south-western part being left low, and broken by a channel of water. On the rocky surface of the causeway, between the lake and the sea, lies a stratum of dark, rounded particles, probably coral, and above it another, apparently composed of decayed vegetable substances. A variety of evergreen trees take root in this bank, and form a canopy almost impenetrable to the sun's rays, presenting to the eye a grove of the liveliest green. The island was lost sight of at the distance of 7 miles.*

Capt. J. Worth, H.M.S. *Calypso*, saw it in February, 1848, and says:—"From its lowness, and the light colour of its soil and sand, it becomes dangerous at night or in hazy weather, as, although the day was fine and tolerably clear when we made it, it was not more than 8 or 9 miles off when first seen from the mast-head. The natives of Pitcairn Island believe the island to be inhabited, but I doubt it."

HENDERSON ISLAND, or ELIZABETH ISLAND.—This island was discovered by the crew of the *Essex* whaler, whose singular history is briefly related by Capt. Beechey.† It was afterwards seen by Capt. Henderson.

Capt. Beechey's description is the most ample:—"We found that the island differed essentially from all others in its vicinity, and belonged to a peculiar formation, very few instances of which are in existence. Wateo and Savage Islands, discovered by Capt. Cook, are of this number, and perhaps also Malden Island. The island is 5 miles in length and 1 mile in breadth, and has a flat surface, nearly 80 feet above the sea. On all sides except the North it is bounded by perpendicular cliffs about 50 feet high, composed entirely of *dead* coral, more or less porous, honeycombed at the surface, and hardening into a compact, calcareous substance within, possessing the fracture of secondary limestone, and has a species of millepore interspersed through it. These cliffs

* Beechey, vol. i. p. 44.

† The fate of the *Essex* has been related in a pamphlet by the mate, published at New York. She was struck by an infuriated whale, which, at the third blow, stove in her bows, and she sunk. The crew took to the boats, and first steering southwards, found this island, where they left two by their own request. Two out of the three boats arrived at the coast of Chili, the third was never heard of; but the wreck of a boat and four skeletons were seen by another ship on Ducie Island, which was probably the boat in question. The two men were subsequently taken off by a ship which had heard of their situation; had they known of Pitcairn Island the whole might have been saved. Its N.E. point is in lat. 24° 21' 20", lon. 128° 19'.

are considerably undermined by the action of the waves, and some of them appear on the eve of precipitating their superincumbent weight into the sea. Those which are less injured in this way present no alternate ridges or indication of the different levels which the sea might have occupied at different periods; but a smooth surface, as of the island, which there is every probability has been raised by volcanic agency, had been forced up by one great subterraneous convulsion. The dead coral, of which the higher part of the island consists, is nearly circumscribed by ledges of living coral, which project beyond each other at different depths; on the northern side of the island the first of these had an easy slope from the beach to a distance of about 50 yards, where it terminated abruptly about 3 fathoms under water. The next ledge had a greater descent, and extended to 200 yards from the beach, with 25 fathoms water over it, and then ended as abruptly as the former, a short distance beyond which no bottom could be found with 200 fathoms of line. Numerous *echini* live on these ledges, and a variety of richly-coloured fish play over their surface, while some cray-fish inhabit the deeper sinuosities. The sea rolls in successive breakers over these ledges of coral, and renders landing upon them extremely difficult. It may, however, be effected by anchoring the boat, and veering her close into the surf, and then, watching the opportunity, by jumping upon the ledge, and hastening to the shore before the succeeding roller approaches. In doing this great caution must be observed, as the reef is full of holes and caverns, and the rugged way is strewn with sea-eggs, which inflict very painful wounds; and if a person fall into one of these hollows, his life will be greatly endangered by the points of coral catching his clothes, and detaining him under water. The beach, which at a distance appears to be composed of a beautiful white sand, is wholly made up of small broken portions of the different species and varieties of coral, intermixed with shells.

“Insignificant as this island is in height compared with others, it is extremely difficult to gain the summit, in consequence of the thickly interlacing shrubs which grow on it, and form so dense a covering that it is impossible to see the cavities beneath. There is no plant producing fruit on it but the *pandanus*, which is the largest tree. And from the narrative of the wreck of the *Essex* whaler, it possesses no spring; the two men left on it finding sufficient for their daily consumption in a small pool, which collected the drainings from the upper part of the island.”*

PITCAIRN ISLAND.—We have included this well-known island in the present chapter, though its character is essentially different from that of the rest which we have to describe, but its situation places it among the list of the low islands.

It was discovered and named by Carteret in 1767, but he gives an erroneous idea of its dimensions. It has been by many supposed to be identical with the *Encarnacion* of Quiros, 1606; but the latter is described as a low island, nearly level with the sea, and 12 leagues in circumference, a character the opposite of Carteret's discovery. Admiral Krusenstern and others therefore consider that

* Beechey's Voyage, part i. pp. 46—48.

Encarnacion must be looked for elsewhere ; the Pitcairn Islanders say it does not exist.

Pitcairn Island derives its interest, and that in no ordinary degree, from the mutiny of the *Bounty*, an incident known to every one. After the mutineers had sent Capt. Bligh and the rest of the crew adrift, April 26, 1789, they bore away in the *Bounty* for Otaheite, but they reached Toubouai, and this was the only intelligence gained of them, for they were obliged to leave on account of warfare with the natives ; they then went to Otaheite, where Christian, after some had landed, cut the cable and put to sea, and was not heard of for many years.

Capt. Mayhew Folger touched on Pitcairn Island, February, 1808, to procure seals, from the account given of it in Carteret's voyage, supposing it to be uninhabited, and for the first time discovered the crew of the *Bounty* ; as a test of this he procured a timepiece and an azimuth compass which had belonged to the *Bounty*. The latter was sent to the Admiralty from Nantucket, March 1, 1813. And nearly about the same time Vice-Admiral Dixon sent intelligence of their existence to Europe, H.M.S. *Briton* having touched there September 17, 1814.*

An interesting account of this first visit of Capt. Sir Thomas Staines, in the *Briton*, is given by Lieutenant Shillibeer, and naturally attracted a very great deal of interest in Europe. The happiness, simplicity, and excellence, of this little, isolated community was, and has been, almost unequalled. It has since been frequently visited and described, and these notices will be found scattered through almost every work on the Pacific. Capt. Beechey, in the *Blossom*, surveyed and has given a minute account of the island and the descendants of the *Bounty's* crew. This will be read with the greatest interest. We cannot follow their career ;—their mutual massacres at first, their happiness afterwards ; the death of Adams, the last survivor ; nor of their discontent and removal to Tahiti, and their return to their chosen island ;—all this must be left to more extended works. It has been found that the *Bounty's* crew were not the first inhabitants, either permanent or incidental, for several morais, or burial-places, have been discovered, the skeletons having a pearl shell (not found here) under the head. Stone hatchets, and other warlike implements, are also among the remnants.

Capt. Worth, of H.M.S. *Calypso*, visited the island in March, 1848. He says the inhabitants appear both healthy and contented, numbering in all 150 ; they describe the climate as being excellent, the soil producing every tropical fruit and vegetable, and many of colder climates, and quite equal to the maintenance of 2,000 persons, the only drawback being the entire absence of springs of water ; this evil has, however, been greatly, if not entirely, overcome, by the construction of tanks for receiving the rain water, which, besides giving them an ample supply for present use, contain a sufficient quantity to ensure them against the risk of an unusually dry season ; indeed they are in the habit of supplying whale-ships with water when occasionally calling for refreshments, as also with fruit and vegetables, pigs, goats, and poultry, which they rear in great quantities.

* See Quarterly Review, vol. xiii. 1815, p. 374 *et seq.*

For the last eight years the average number of ships calling at this island has been eight, and principally consist of American whalers.

Lieut. J. Wood, of H.M.S. *Pandora*, also came here in 1849; and the following is the information collected by him from the natives.

The soil is very rich but porous, a great proportion decomposed lava, the other a rich black earth with clayey ground; climate temperate, thermometer 59° to 89° in the shade. Spring commences in August, which is the harvest, when they dig their yams and potatoes, which are their principal food. They have two crops of potatoes per year, which are planted in February and July, and dug in June and November.

No REGULAR TRADE WINDS; in the summer months the wind prevails mostly from E.S.E. to N. Northerly winds are generally light, often accompanied with rain or fog; when the wind is North it invariably goes round to the westward, from which quarter and S.E. are the strongest gales; when it is S.W. it is generally clear weather with moderate breezes. During the winter season the prevailing winds are from S.W. to E.S.E.

The animals are hogs, goats, and poultry. Vegetables—yams, sweet and Irish potatoes, the api root and taro in small quantities. Fruits—plantains, pines, melons, oranges, bread-fruit, sugar-cane, limes, and the vi or Brazilian plum. Grain—maize.

Food chiefly yams and potatoes. Animal food two or three times a week. Fish is getting scarce. Bedclothes are generally manufactured by the females from the ante or paper mulberry. Wearing apparel obtained from whale-ships in exchange for vegetables, &c. Often in want of cotton cloth, blankets, and woollen articles; soap scarce.

The average number of ships touching at the island annually is about eight, mostly Americans, and always behave well. Last year there were seven, ten less than the year before; the last vessel that touched here was an English brig from New Zealand bound to California with emigrants; eight English females amongst them.

On the 1st of January a chief magistrate and councillor are elected; all over sixteen years of age are voters (both male and female); the chief magistrate then chooses his councillor or secretary. The duty of the magistrate is to convene meetings and hear cases; it is then left to the decision of a jury of five persons, and if the decision is not satisfactory to both parties, they are allowed to appeal to the commander of H.B.M. ships of war; punishments are generally fines or labour. The inhabitants generally retire to rest early, and rise with the sun. From August to November they have plenty of employment, digging yams; also planting bananas, yams, and potatoes, weeding ground, &c. When not busily employed, they generally meet in the morning, and if the weather is favourable go fishing, and if not, on Saturday go goat hunting for a Sunday dinner. On the arrival of a ship off the island, no one is allowed to go on board before the pilot; he always takes charge of the boats when landing, and provides for the captain when on shore; each family in rotation stands pilot, or provides a deputy, who always expects a small remuneration for his services.

The females generally assist in the cultivation of the ground, preparing thatch for the houses, &c., and in fact are more employed than the males; they are generally very strong, many of them being able to carry a barrel of potatoes down to the landing place.—(Nautical Magazine, December, 1849, p. 696.)

The ISLAND is about $2\frac{1}{2}$ miles long, in an E. by S. and W. by N. direction, and about one mile broad. The entire circuit of the island, with one or two exceptions, is perpendicular, and will not allow of any landing. Its appearance is very pleasant, and its height, about 1,100 feet, will allow it to be seen 50 miles off.

There is nothing particular in its appearance on making it; and lying in the midst of the Pacific, it may almost be said to lie in the variables, as the true trade wind does not blow home.

It is thickly clothed to its summits with the most luxuriant verdure, terminating in lofty cliffs, skirted at their bases with thickly branching evergreens, which afford a welcome retreat from the burning rays of an almost vertical sun. The coast is fringed with formidable barriers, which seem to present insurmountable obstacles to landing, except in Bounty Bay, situated on the N.E. side, and even here it is impracticable when it blows strong. A white flag is hoisted at the village on the approach of any English ship when landing is practicable in Bounty Bay.

On passing round the East end from the southward, *St. Paul's Point* is shaped by the most grotesquely formed, tall, spiral rocks, and the island called *Adam's Rock* becomes visible. Having passed this rock a cable's length to the N.W., you are abreast of Bounty Bay, when you must stand on and off, as there is no safe anchorage.*

BOUNTY BAY is the only place where ships communicate with the shore, and this not by means of their boats, but by the island canoes, which are very light, and carried up to the top of the cliffs. The islanders congratulate themselves on the security afforded by the difficulties of landing. They, however, prove most expert pilots and assistants in communicating between the ship and the shore. To get off stock, a large boat should be anchored outside the surf, and everything brought out to her in the canoes.

ADAMSTOWN, which is a short distance to the West of Bounty Bay, is the only point where the people are congregated. Their houses are well built, clean, and comfortable, and in every respect this little community cannot but command the admiration of the world.

There is another *landing place* at the West end of the island. It is a very good one, with East, N.E., or S.E. winds, but the walk from it to the settlement over the hills is a fatiguing one.

There is very generally a westerly current running past the island, and frequently a strong one; this must be taken into consideration in making the island.

* Anchorage off some parts may be had in 30 to 35 fathoms at a quarter of a mile distant, or even more; but the ground being foul, it would be injudicious to anchor, unless to avoid being drifted on shore in calms, &c.—*Capt. Worth, R.N.*

The position of Adamstown, according to the observations of Capt. Beechey, is lat. $25^{\circ} 3' 37''$, lon. $130^{\circ} 8' 23''$.*

OENO ISLAND was discovered by Capt. Henderson, in the *Hercules*, but its name is derived from a whale-ship, whose commander thought it a new discovery. It is so low, that it can only be seen at a short distance, and therefore is highly dangerous. The reef completely surrounds the lagoon: near the centre of it is a small island, covered with shrubs; and towards the northern extremity are two sandy islets a few feet above water. The lagoon was in places fordable as far as the wooded island, but in other parts it appeared to be 3 or 4 fathoms deep. The reef is entirely of coral formation, and has deep water all round it. Just clear of the breakers there are 3 or 4 fathoms water; the next cast is 13 fathoms, then follow rapidly 30 and 60 fathoms, and no bottom at 100 fathoms. The S.W. part of the reef is the highest, and the lagoon in that part nearly filled up. There are of course no inhabitants. Capt. Beechey's party effected a landing with great hazard, but lost one lad in the attempt to get off. Its North point is in lat. $24^{\circ} 1' 20''$, lon. $130^{\circ} 41' W.$ †

CRESCENT ISLAND, or *Temoe*, was discovered by Capt. Wilson, in the missionary voyage of the *Duff*.‡ It is exactly $3\frac{1}{2}$ miles in length and $1\frac{1}{2}$ miles in width, and of similar formation to Oeno and Ducie Islands. It consists of a strip of coral 100 yards in width, enclosing a lagoon, and generally about 2 feet above the water. Upon the strip are several small islands, the highest, 6 feet above the sea, covered with trees, nearly 20 feet high. About forty inhabitants were seen by Capt. Beechey, who probably live on the nut of the pandanus or screw-palm, and shell-fish. The South extreme is in lat. $23^{\circ} 20' 29'' N.$, and lon. $134^{\circ} 35' 8'' W.$

The GAMBIER ISLANDS were discovered by Capt. Wilson, in the ship *Duff*, May 25th, 1797, and named by him after Admiral Lord Gambier.§ The group consists of an encircling coral reef of an irregular triangular figure, enclosing five large and several smaller islands. They are of some importance to the navigator, inasmuch as they afford a supply of water (but water only); the only source, except Pitcairn Island, between Tahiti and Peru or Chile. Their native name is *Manga Reva*.

The highest point is *Mount Duff*, nearly in the centre of the group, and 1,248 feet high. It is at the southern end of the principal island, named *Peard Island* by Capt. Beechey, after his first lieutenant. The other islands were named in succession, Belcher, Wainwright, Elson, Collie, and Marsh, after the other officers.

Peard Island is about 6 miles in length, and Mount Duff rises into two peaks in the form of wedges, very conspicuous at a distance, and may be seen 14 or 15 leagues. All the islands are steep and rugged, particularly Marsh Island,

* Accounts of this island, and the transactions connected with it, will be found in Bligh's Voyage of the *Bounty*, chap. 13, p. 154, *et seq.*; Missionary Voyage of the *Duff*, pp. 51-2; Quarterly Review, 1815, p. 374; Narrative of the *Briton's* Voyage to Pitcairn Island, by Lieut. J. Shillibeer, p. 77, *et seq.*; Journal of a Whaling Voyage, by J. D. Bennett; Journal of the Royal Geographical Society, vol. iii. p. 265, vol. vii. p. 213; Beechey's Voyage of the *Blossom*, vol. ii.; *cum multis aliis*.

† Voyage of the *Blossom*, vol. i. pp. 101-103.

‡ Beechey, vol. i. pp. 103-4.

§ Missionary Voyage, pp. 115-6.

which, at a distance, resembles a ship. The external form of these islands conveys at once an impression of their volcanic origin; and, on examination, they all appear to have been subjected to the action of great heat. There are no appearances of pseudo-craters on any of the islands; but they are clothed for the most part with trees. The surrounding reef is conspicuously contrasted to the islands. It is fast growing up in the lagoon, and on the N.E. side already bears a fertile soil, with trees and habitations. In the opposite direction it dips 30 or 40 feet beneath the surface, affording an entrance to the lagoon within. The outer side of the wall springs from an unfathomable depth; the inner descends with a slope to 120 or 150 feet. The inhabitants, estimated by Beechey at 1,250 or 1,500 in number, have a fine Asiatic countenance, and are fairer and handsomer than the Sandwich Islanders, but less effeminate than those of Otaheite. They are treacherous, chaste, and have no canoes, using large rafts or catamarans instead.*

As these islands may be visited for watering, we give Capt. Beechey's directions for entering the group:—

This group consists of eight high islands, surrounded by coral islands and reefs, enclosing a lagoon, in which there are several secure anchoring places; but the lagoon has many knolls, which render necessary a good lookout from aloft, and even the precaution of keeping a boat ahead. As the islands only afford a supply of water, the anchorage under Mount Duff is the most desirable.

The best channel to enter by lies on the eastern side of the group, to the southward of all the coral islands; and with Mount Duff bearing N. 39° W., *true*, in one with the South tangent of the easternmost high island. With these marks steer boldly over the reef, upon which there are, in this part, 6 fathoms water, and pass close to the southern extreme of the island, before in one with Mount Duff. Then, keeping a boat ahead, proceed under easy sail for the anchorage, about a quarter of a mile South of Mount Duff, the peaks bearing about North, *true*; but do not attempt to go to the northward, as all that part of the lagoon is full of reefs and knolls. In this situation a ship will be abreast of two streams of good water; but there will be some difficulty in procuring it, on account of the ledges of coral which surround this and all the other islands. As the ground is rocky, it is advisable to use a chain cable. There are several other anchorages, and water may also be had at the north-eastern island; but this appears to me to be, on the whole, the most convenient. There are also other passages over the reef; and the islands lying to the S.E. may be passed on either side; but those which I have recommended are the best, and most convenient for navigation with the trade wind. The western channel must not be attempted, and all the south-western part of the group should be avoided as dangerous. The best passage to sail out at bears about South, *true*, from Mount Duff, the eastern bluffs of Peard Island, upon which Mount Duff is situated, in one. This mark will lead over the bar in 6½ fathoms. Though this channel lies to the leeward of the group, there is generally a very heavy swell upon the reef; and it would not be advisable to

* Voyage of the *Blossom*, vol. i. pp. 103—144, giving a full and interesting account of these islands and their inhabitants.

attempt it in light winds, as there is no anchoring ground outside; and the swell and the currents, which sometimes run strong, might drift a vessel upon a shallow part of the bar, either to the eastward or westward of the channel, upon which the sea breaks heavily in 4 fathoms, and outside which there is no bottom at 80 fathoms, within 40 yards of the breakers.

The plan which I have given of these islands must not be considered complete, as such a survey required more examination than I could bestow; and there are, no doubt, many knolls of coral on the lagoon which we did not discover. A careful lookout from aloft is therefore absolutely necessary.

It is high water at 1^h 50', full and change; but a current generally sets to the westward in the daytime, and runs strong in the western channel.—(Beechey, vol. ii., Appendix, p. 646.)

The eastern peak of Mount Duff is in lat. 23° 7' 58" S., lon. 134° 55' 21" W.

LORD HOOD'S ISLAND, or *Marutea*, was discovered in 1791, by Capt. Edwards, in the *Pandora*. It consists of an assemblage of small islets, rising from a chain of coral, even with, or a little above, the water's edge. "Upon these grew a variety of evergreen trees, thickly intertwined, among which the broad leaves and clusters of fruit of the pandanus were conspicuous, and beneath them a matted surface of moss and grass, so luxuriantly and invitingly cool, that we were almost tempted to land at any risk. The sea, however, broke so heavily on all parts of the shore, that the attempt would have been highly dangerous." Krusenstern states that it is inhabited, but Capt. Beechey saw no signs of such: though it must have been the case once, as a small stone hut stands on one of its angles. It is 11½ miles in length and 4½ miles wide, in a North and South direction; and, like almost all the coral islands, it contains a lagoon, and is steep on all its sides. Lat. of the W. point, 21° 30' 50", lon. 135° 33' 19" W.*

MARIA ISLAND, discovered by Mr. Thomas Ebrill, of the *Amphitrite*, in 1832, is placed by him in lat. 22° 5' S., lon. 136° W. He describes it as low, and 4 miles in length. He landed on it.† This can be no other than that described as a discovery in December, 1835, by *M. Denis*; lat. 21° 59' S., lon. 136° 12' W. He describes it as long, low, wooded in the centre; the northern and southern extremes planted with cocoa-nut trees: no traces of inhabitants to be seen.‡

We have also an account of the supposed discovery of a low coral island, in lat. 22° 4' S., lon. 136° 20' W., on March 27th, 1837, by Capt. Wright, of the *Medway*:—"At 2^h 30' the middle of the island bore due South, distant 4 miles. The whole island might be about 7 miles in circumference, and containing a large lagoon. At the East end there is a reef, about a mile long, on which the sea broke very high. The western extremity is woody, but without any cocoa-nut trees, as is frequently the case: it is apparently uninhabited. The middle of it is in lat. 22° 4' S., lon., by a good chronometer, 136° 20' W. This being a new discovery, I have named it Wright's Lagoon Island."§

* Beechey, vol. i. pp. 145-8.

† Journal of the Royal Geographical Society, vol. vii. p. 456.

‡ Bulletin de la Société de Géographie de Paris, August, 1837.

§ The Australian, newspaper; Nautical Magazine, November, 1837, p. 769; and Bull. de Soc. Imp. des Scienc. de St. Petersburg, vol. vii. No. 11, p. 9.

Notwithstanding the discrepancies between these accounts as to the size and position, they are without doubt the same island : part of them may be reconciled by the difference in its extent at high and low water.

After quitting Lord Hood's Island we looked in vain for an island which Mr. Wilson supposed he saw in lat. $20^{\circ} 30' S.$, and about lon. $223^{\circ} 18' E.$, but was doubtful whether it might not have been a cloud.* It was not seen by us.†

The AMPHITRITE or ACTÆON ISLANDS were first discovered by Mr. Thomas Ebrill, in the Tahitian merchant vessel, the *Amphitrite*, in 1833; but were first made known to geographers by Capt. Lord Edward Russell, in the ship whose name they bear, January 3rd, 1837.‡ The following is the *Actæon's* account of them :—While standing to the N.E. we discovered land, and, at three P.M., being within 3 miles of the western island, bearing N.N.W., we made out three very low wooded islands, with a heavy surf on the beach, and no appearance of any anchorage : the north-westernmost island appeared to be a lagoon island, with a reef extending about three-quarters of a mile from its N.W. and S.E. (N.E. ?) extremes. The names affixed, and their positions, are respectively as follow :—

Bedford Island, N.W. point, lat. $21^{\circ} 18' 30'' S.$, lon. $136^{\circ} 38' W.$

Minto Island, centre „ $21^{\circ} 23' 0''$ „ $136^{\circ} 32' W.$

Melbourne Island, centre „ $21^{\circ} 28' 30''$ „ $136^{\circ} 27' W.$

From the chart made by Mr. Biddlecombe, master of H.M.S. *Actæon*, it appears that the islands extend about 13 miles in a N.W. and S.E. direction, the centre island being about 5 miles in length. No traces of inhabitants are mentioned. The positions above given, determined by three chronometers, it is presumed are correct.

The current off these islands, with a light westerly wind, sets E.N.E. 7 miles in twenty-four hours; but it varied with the wind, and usually set to the westward.§

CARYSFORT ISLAND, or *Turfeis*, was discovered by Capt. Edwards, in the *Pandora*, in 1791. It is of coral, and the strip of land is so low, that the sea in several places washes into the lagoon. The weather side and points of the island, as in others, are most wooded; but the vegetation on the whole is scanty. There is no danger near this island. The outer part of the bank descends abruptly. Lat. of the East extreme, $20^{\circ} 44' 53'' S.$, lon. $138^{\circ} 19' 28'' W.$ ||

Between Barrow and Carysfort Islands Capt. Beechey found a strong current setting southward.—(January, 1826.)

COCKBURN ISLAND was discovered by Capt. Beechey, February 2nd, 1826, in a search for Osnaburgh Island of Capt. Carteret. It is a small coral island, $3\frac{1}{2}$ miles in length by 3 miles in width. Its form is nearly an oblong, with the southern side much curved. The lagoon in the centre was deep; its boundary very low and narrow, and in places it overflowed. Several ripples

* *Missionary Voyage*, p. 118.

† Beechey, vol. i. p. 146.

‡ Mr. Biddlecombe states that they were supposed to have been discovered in 1834, by a Mr. Henry, the son of a missionary of Tahiti, and he named them after his wife, *Sophia Islands*. But perhaps it is mere rumour, as in the latitude given by him they were not to be found.—*Nautical Magazine*, August, 1838, p. 520.

§ *Journal of the Royal Geographical Society*, vol. vii. part ii. pp. 454-5.

|| Beechey, vol. i. p. 158.

were observed about these islands, but were passed through without obtaining soundings. Lat. $22^{\circ} 12' S.$, lon. $138^{\circ} 40' W.$ *

OSNABURGH ISLAND was discovered by Capt. Carteret in 1767, who describes it as being small, flat, and so far awash, as scarcely to merit the name of an island. The progress of this coralline formation is interesting in the history of these low islands. In 1792, the *Matilda*, a whaler, was wrecked in the night-time, on a reef of coral rocks, in lat. $22^{\circ} S.$, and lon. $138^{\circ} 34' W.$ In February, 1826, Capt. Beechey, exploring the vicinity, determined the identity of these same spots, by finding, on the back part of the reef, unequivocal signs of a shipwreck; two anchors, a cannon, metal boiler, and a leaden pump, dated 1790. That these were the remains of the unfortunate vessel in question there can be but little doubt, though they now lay beyond the reach of the waves, and the island on which they were found extends 14 miles in length, and has one of its sides covered nearly the whole of the way with high trees, which, from the spot where the vessel was wrecked, are very conspicuous, and could not fail to be seen by persons in the situation of her crew.

This island differs from other coral formations in having a greater disproportion in the growth of its sides. The one to windward is covered with trees, as before mentioned, while that to leeward is nearly all under water. The dry part of the chain enclosing the lagoon is about a sixth of a mile in width, but varies considerably in its dimensions: the broad parts are furnished with low mounds of sand, which have been raised by the action of the waves, but are now out of their reach, and mostly covered with vegetation. The violence of the waves upon the shore, except at low water, forces the sea into the lake at many points, and occasions a constant outlet through the channel to leeward. On both sides of the chain the coral descends rapidly; on the outer part there are from 6 to 10 fathoms close to the breakers: the next cast is 30 or 40 fathoms; and, at a little distance, there is no bottom with 250 fathoms. On the lagoon side there are two ledges: the first is covered about 3 feet at high water; at its edge the lead descends to 3 fathoms to the next ledge, which is about 40 yards in width: it then slopes to about 5 fathoms at its extremity, and again descends perpendicularly to 10; after which there is a gradual descent to 20 fathoms, which is the general depth of the centre of the lagoon. The lake is dotted with knolls or columns of coral, which rise to all intermediate heights between the bottom and the surface, and are dangerous to boats sailing in the lagoon with a fresh breeze, particularly in cloudy weather, as they are then difficult to distinguish.

The lagoon is entered by an opening to the eastward. The channel was sufficiently wide and deep for a vessel of the class of H.M.S. *Blossom*, but care was required on account of the before-mentioned coral rocks. The lagoon proved in every respect to be an excellent harbour.

There are no cocoa-nut or other fruit trees upon it, nor any vestiges whatever of inhabitants.

The island, which differs very considerably from the position given by Capt. Carteret, is in lat. $21^{\circ} 50' 32''$, lon. $138^{\circ} 44' 28'' E.$ extreme; but the reef was

* Beechey, vol. i. p. 150.

unsuccessfully sought for many miles in the passage in both directions. The Matilda Reef and Osnaburgh Island may therefore be considered as identical.*

BLIGH ISLAND (or *Hereheretua*) was discovered by Capt. Bligh in 1792, and named by him *Lagoon Island*. It is larger than was shown on Arrowsmith's chart, and is inhabited. The natives seen by Capt. Beechey are darker than the Lagoon Islanders of Cook, and were all provided with stones, clubs, and spears. is in lat. $31^{\circ} 27' 41''$ S., lon. $140^{\circ} 37' 58''$ W.†

GLOUCESTER or MARGARET ISLAND (or *Nukutipipi*, or *Nihirow*).—The first of these names is derived from Carteret, in 1767; the second from the observations of the *Margaret*, in 1803. Its true position was also ascertained by the United States' Expedition. M. Mauruc says that there is no entrance to the lagoon, and but little or no mother-of-pearl. There are some cocoa-nut trees, and very few people, but harmless.‡ From the American examination it proved to be a small, round lagoon island, 2 miles in circumference, high, and well wooded on the North side, with a flat, submerged reef on the S.E. and East sides. Lat. $20^{\circ} 23'$, lon. $143^{\circ} 37'$.

CORONADOS, or FOUR CROWNS, discovered by Quiros in 1606, is called *Teku* by the natives. It has now *five* clumps of trees. It had no opening to its lagoon, nor could a landing be effected. No traces of inhabitants were seen on either side of the last two islands.§ Lat. $20^{\circ} 38'$, lon. $143^{\circ} 22'$.

SAN MIGUEL ARCANGEL ISLAND (or *Heretua*) is one of the earliest discoveries in the Pacific, having been named by Quiros in 1606. Its true situation and character were not, however, ascertained until the visit of the United States' Exploring Expedition in 1841.

On the 10th of January, Lieut. Ringgold made what they supposed to be the Island of Arcangel, but very much out of place:—"It is a small lagoon island, of oblong shape, lying N.W. and S.E., wooded on the N.E. and East, with a stunted growth of trees. No cocoa-nut trees were seen, and the eastern portion of the trees appeared as if burnt. A reef extends off the N.W. and S.W. sides, with a heavy surf, and there is a submerged reef on the South and West sides. No opening exists, and a landing cannot be effected without imminent danger to the boats. Its native name is *Heretua*, and it is in lat. $20^{\circ} 23'$, and lon. $143^{\circ} 47'$. The supposed situation of Arcangel was then searched for, but no signs of land found. *Turnbull Island* was also looked for in vain."||

SAN PABLO (or CONVERSION or ST. PAUL) was also discovered by Quiros, in 1606, and was examined by Lieut.-Com. Ringgold, in the American Exploring vessel *Porpoise*, and also by M. Mauruc. The latter says it is very low, but the former that it is higher than those to the S.E. of it. It encloses a lagoon, but has no pearl-shells. It has several cocoa-nut groves. No opening was seen into its lagoon. The inhabitants were the dark-skinned race who resisted the landing of the Americans.¶ Lat. $19^{\circ} 56'$, lon. $145^{\circ} 0' W$.

Among the islands which still remain problematical, is that extensive group

* Beechey, vol. i. pp. 158—162; Krusenstern's Supplement.

† Beechey, vol. i. p. 162.

‡ Bull. Soc. Géog., Paris, 1848, p. 82.

§ Narrative of the United States' Exploring Expedition, vol. iv. p. 266.

|| *Ibid*.

¶ *Ibid*.; Bull. Soc. Géog., 1848, p. 85.

called *St. ELMO* by Quiros, in 1606, which, according to Burney's account, is in lat. $21^{\circ} 20' S.$, lon. $143^{\circ} 50' W.$; it is low, surrounded with coral reefs, and having a circumference of 30 Spanish leagues. It has not been since found, and therefore may be intended for some other part.

Another doubtful island is marked on the chart as *Britomart Island*, lat $19^{\circ} 52'$, lon. $145^{\circ} 23'$, but has not been since seen.

FAITH ISLAND is marked by Lieutenant Raper as lying between Osnaburgh and Barrow Islands; it is small, and in lat. $21^{\circ} 10'$, lon. $138^{\circ} 52'$.

BARROW ISLAND, or *Teku*, was discovered by Capt. Beechey on Jan. 31st, 1826. It is a small coral island, only $1\frac{1}{2}$ miles in length North and South, and $1\frac{1}{4}$ miles in width. It consists of a narrow strip of land, not more than 200 yards wide in any part, with a lagoon in its centre, probably of no great depth. Upon the shores of the lagoon the pandanus, cocoa-nut, and evergreens common to these formations, constitute a thick wood, affording a cool retreat from the scorching rays of a vertical sun, and the still greater annoyance arising from the reflection of the bright white sand. Under these trees Capt. Beechey found three large pits, containing several tons of fresh water, and not far from them some low huts, apparently long deserted, but containing some evidences of former visitors. These were subsequently found to be a party of natives from Chain Island, who had been drifted here, and were afterwards found by Capt. Beechey at Byam Martin Island. Capt. Beechey's party collected a tolerable supply of hard wood on Barrow Island, very well adapted for fuel. No natives on it, but some of their canoes were found on the lagoon. The North end is in lat. $20^{\circ} 45' 7'' S.$, lon. $139^{\circ} 3' 9'' W.$ *

WHIT-SUNDAY ISLAND, or *Temata-leiwuwau*, was discovered by Capt. Wallis in 1767, but is $40'$ to the West of his position of it. Capt. Beechey says it is only $1\frac{1}{2}$ miles in length instead of 4 miles, as stated by Capt. Wallis. It is steep all round, of coral formation, and containing a lagoon. The general height of the soil is 6 feet above the level of the sea, of which 2 feet are coral rock; from the trees to the surf there is a span of hard rock nearly 150 yards in length, covered with about a foot of water, beyond which it descends rapidly, and at 500 yards' distance no bottom was found with 1,500 feet of line. On the inner side, from the trees to the lake, is a gentle declivity of muddy sand, filled with shells. The trees, which formed a tolerably thick wood round the lagoon, consist principally of pandanus and cocoa-nut. On the South side of the island there was a very narrow entrance to the lagoon, too shallow for boats, even if the water had been smooth; this is possibly alluded to by Capt. Wallis. The lagoon is comparatively shallow, and the space between the islets very rugged, and full of deep holes. Capt. Beechey found evidences of inhabitants, though none were seen. He places a large tree near the N.W. extreme, in lat. $19^{\circ} 17' 40'' S.$, lon. $138^{\circ} 42' 28'' W.$ †

CLERMONT TONNERE ISLAND was first seen by Capt. Duperrey, of the French marine, in *La Coquille*, on April 22nd, 1822. There is every probability, notwithstanding Admiral Krusenstern's opinion otherwise (vol. i. p. 287), that it

* Beechey, vol. i. pp. 157-8.

† *Ibid.* p. 152.

is the same placed in a different position by the English vessel, the *Minerva*, on June 27th, in the same year, and named after the ship.*

Clermont Tonnerre, named after the French Minister of Marine, bears a very close resemblance to Hood's Island, but is inhabited and clothed with cocoa-nut trees. The natives, however, are a very inferior race to those of the Gambier Islands. The island is very narrow, particularly at the extremities, and when seen at a distance does not appear to be half a mile wide. It is of the same formation as Hood's Island, but more perfect. With the exception of a few breaks on the southern shore, by which the sea, when high, may at times communicate with the lagoon, it is altogether above water. At the extremities and angles the soil is more elevated than in any other parts, as if the influence of the sea had been more felt upon them, and heaped up the coral higher. They are also better provided with shrubs, and particularly cocoa-nut trees, the soil resting upon the debris being probably deeper. The lagoon has several small islets in it, and the shores all round are steep, and abound with fish, but Capt. Beechey did not see any sharks.†

In the position given by Capt. Beechey (lat. $18^{\circ} 33' 42''$ S., lon. $136^{\circ} 1' 32''$ W.) there appears to be some error in the calculation, for it differs from that of Capt. Duperrey, which latter was confirmed by Capt. Wilkes, in the American Exploring Expedition, lat. $18^{\circ} 33' 42''$ S., lon. $136^{\circ} 20'$ W. This was the first coral island seen by that expedition (13th August, 1839), and naturally attracted much interest; we therefore quote the words of the commander:—

“At first sight the island looked much like a fleet of vessels at anchor, nothing but the trees being seen in the distance, and as the ship rises and sinks with the swell of the ocean, these are alternately seen and lost sight of. On a nearer approach the whole white beach was distinctly seen, constituting a narrow belt of land, of a light clay colour, rising up out of the deep ocean, the surf breaking on its coral reefs, surrounding a lagoon of a beautiful tint, and perfectly smooth. This island was 12 feet above the level of the sea, and 600 feet wide to its lagoon, and is composed of coral, debris, and vegetable matter. The shrubs are few, and not more than 12 or 15 feet high, the cocoa-nut, palms, and pandanus showing conspicuously above them. We found it, by our survey, to be 10 miles long by $1\frac{1}{2}$ wide, lying in a W.N.W. and E.S.E. direction. The first sounding on the East side of the island, at 300 feet from the reef, was obtained in 90 fathoms (coral sand); at 180 feet, 85 fathoms (coral sand); at 130 feet, 7 fathoms (hard coral), being at the edge of a nearly perpendicular shelf; thence to the shore the bottom was uneven, decreasing to 4, 3, and 2 fathoms, until a second or upper coral shelf rose, over which the water flowed at high tide. This extended to where the beach is composed of broken coral and shells, and rose on a gentle declivity to 10 feet high.

“The *Peacock* sounded within three-quarters of a mile from the southern point of the island; at 350 fathoms the lead brought up for a moment, and then again descended to 600 fathoms, without reaching bottom. When it was hauled up it had a small piece of white and another of red coral attached to it. The

* Asiatic Journal, No. 92.

† Beechey, vol. i. pp. 147-8.

West side of the island is a bare reef, over which the surf breaks violently. There is no opening or entrance to the lagoon."

The party endeavouring to land met with much opposition from the natives, a fine athletic race, much above the ordinary size, about 120 of whom were seen. The common house-fly was found in great numbers at the island.*

SERLE ISLAND, or *Apucarua*,† was discovered in the missionary voyage of the *Duff*, by Capt. Wilson, 28th May, 1797, who named it after the author of the *Horæ Solitariæ*. Krusenstern says:—"It is the highest island of all this archipelago; two hills mark its N.W. and S.E. extremes, and a third marks the centre of the island.‡ These distinctive marks will serve as points of recognisance to vessels approaching this archipelago from the eastward."§ Capt. Beechey says that in this Krusenstern has been misled by some navigator who mistook the trees for hills, and over-estimated the height of them, as the tallest does not exceed 50 feet. When it is approached from the eastward, it appears to be a low strip of land, with a hillock (of trees) at each extreme.

The island is $7\frac{1}{2}$ miles in length in a N.W. direction, and $2\frac{1}{2}$ miles in width in its broadest part. It is of coral formation, and very similar to Clermont Tonnere. Its windward side is the most perfect; the southern side of the chain, however, differs in being wider, and having a barren flat, full an eighth of a mile wide, outside the trees. On this account it is necessary for a ship to be cautious in approaching it during the night, as it is so low that the breakers would be the first warning of their situation. The lagoon is very narrow, and apparently shallow, with several islands in the middle. There is not the smallest opening into it, even for a canoe. There is no mother-of-pearl in it. Besides clumps of trees at the extremities of the island, which at a distance have the appearance of banyan trees, there are several clusters of palms; a distinction recommended by Capt. Beechey to the attention of commanders of vessels, as, besides assisting them in identifying the islands, it will enable them to estimate their distance from them with tolerable precision.|| There are but few inhabitants on it.

Its S.E. extreme is in lat. $18^{\circ} 22' 39''$, lon. $136^{\circ} 55' 3''$;¶ by Wilkes, lat. $18^{\circ} 21' 10''$, lon. $137^{\circ} 4' 10''$.**

EGMONT ISLAND, or *Tatakoto*, was discovered by Wallis, 1767.†† It is of coral, and the reef is so low toward the centre, that in high tides there can be no communication with the extremities. The island is steep, like all the other coral islands, and well wooded with cocoa-nut and pandanus trees, and has one of the large clumps at its N.W. extremity. Capt. Beechey found that no boat

* Narrative of the United States' Exploring Expedition, vol. i. p. 312.

† Or Apoucaroua (M. Armand Mauruc).—*Bull. Soc. Géog.*, 1848, p. 74.

‡ Capt. Wilson named two clumps that stood at a little distance from each other, on the S.E. part, the *Turk's Cap* and *Friar's Hood*.—P. 118. § Krusenstern, vol. i. p. 276.

|| Capt. Wilson landed at low water on the island, and to his trouble, that this was the only period when it was possible to do so, as it was with great difficulty that he regained his boat on the following day, at the same period of tide.—*Voyage of the Duff*, pp. 120—122.

¶ The distance between Serle Island and Clermont Tonnere was found by Capt. Wilkes to be $26\frac{1}{2}$ miles, and no sign of any island existing between the two; thus deciding as to the meridional differences between Duperrey and Beechey.—*American Exploring Expedition*, vol. i. pp. 315—357.

** Beechey, vol. i. p. 150.

†† This island was discovered by Wallis from following the direction taken by the natives of Lagoon Island, who deserted it for this. They are many miles out of sight of each other.

could land on the windward island, nor on any other part of the island; to leeward the S.W. swell rolled even more heavily upon the shore than that occasioned by the trade wind on the opposite side. He saw about fifty inhabitants on the beach. North extreme, lat. $19^{\circ} 22' 59''$, lon. $139^{\circ} 12' 3''$.*

TRES COCOTIERS, or *Three Cocoa-Nut Trees Island*, is first described by M. Armand Mauruc. He saw it from near Egmont Island, and places it in lat. $19^{\circ} 8' S.$, and $10' W.$ from Egmont ($139^{\circ} 22'$). It is very low and very small. If it is not always inhabited, it is so occasionally. He thought that it did not enclose a lagoon.†

BYAM MARTIN ISLAND, or *Nganaiti* (or *Letho?*), was discovered by Capt. Beechey, February, 1826, and named after the comptroller of the navy. The island is nearly of an oval form, of $3\frac{1}{2}$ miles diameter. It is of coral formation, and has a lagoon and productions very similar to the other islands recently described. One species of coral not noticed before was seen in the lagoon, growing above water; it was a millepore, extending itself in vertical plates, parallel to the shore. From the pemphis Capt. Beechey procured a large supply of firewood, to which use it is well adapted, as it burns a long time, gives great heat, is as hard as *lignum vitæ*, and equally good for tools. On the island Capt. Beechey found a party of natives who had reached this island from Chain Island with dreadful suffering and privation, and were here wrecked. They had set out from Chain Island for Tahiti, and were drifted to Barrow Island, and then came on to here. Byam Martin Island is in lat. $19^{\circ} 40' 22''$, lon. $148^{\circ} 22' 28'' W.$ ‡

CUMBERLAND ISLAND, or *Manuwangi*, was discovered by Wallis in 1767, who describes it to be 6 miles long, and $1\frac{1}{2}$ miles broad. It is in lat. $19^{\circ} 13'$, lon. $141^{\circ} 11' W.$

GLOUCESTER ISLAND, *Hāriri*, or *Toué-toué*, was discovered by Capt. Wallis in 1767. "Its appearance has been accurately described by its discoverer, but its present form and extent differ materially. At the S.E. angle of the island we noticed a morai built of stones, but there were no inhabitants upon the shore. In passing to windward of the island, the current sets so unexpectedly strong upon it, that the ship was, for a considerable time, in imminent danger of being thrown upon the rocks, and her escape is entirely attributable to the rapid descent of the coral reef, which was at times almost under her bottom. She, however, fortunately cleared the reef, and was immediately in safety.§ Lat. $19^{\circ} 8'$, lon. $140^{\circ} 37'.$ "

LANCIERS or THRUM CAP ISLAND, or *Pukerua*, discovered by Bougainville in 1768, and seen by Cook in 1769, is of coral, three-quarters of a mile in length, well wooded, and steep all round. No bottom was found at a mile distant with 400 fathoms of line. Some slabs placed erect, and a hut, showed it had once been inhabited.|| M. Bougainville gave the name of Des Lanciers to it prior to Cook's visit in 1768, in consequence of the people on it being armed with long spears. Lat. $18^{\circ} 30' 8''$, lon. $139^{\circ} 8' 0''$.

* Beechey, vol. i. p. 157.

† Beechey, vol. i. pp. 162—165.

‡ Bull. de la Soc. de Géog. par. 1848, p. 76.

§ *Ibid.* vol. i. p. 166.

|| *Ibid.* vol. i. p. 158.

QUEEN CHARLOTTE'S ISLAND, or *Aki-Aki*, was discovered by Wallis in 1767. Capt. Beechey says that it is of coral formation, so grown up that we could not see any lagoon in its centre, as we had done in all the others to the eastward. Several huts and sheds, similar to those on Whit-Sunday Island, occur in a bay on its northern shore, but there were no inhabitants. When Wallis visited this island the natives took to their canoes, and fled to the next island to the westward; whether they did so on the present occasion we could not determine, but in all probability we should have seen them if they had done so. This island afforded Capt. Wallis a plentiful supply of cocoa-nuts, but at present not a tree of that description is to be seen. The shore is more steep than either Clermont Tonnerre or Whit-Sunday Islands, and the huts more numerous.* Lat. of East extreme, $19^{\circ} 17' 40''$, lon. $138^{\circ} 42' 28''$ W.

FOUR FACARDINS, or **LAGOON ISLAND**, called *Teay* by the natives, was discovered by Bougainville in 1768, and Capt. Cook in his first voyage in 1769.

It is 3 miles in length in a W. by S. direction, and $1\frac{1}{2}$ miles in width. Its general figure has been accurately described by Cook; the southern side is still the low reef of breakers which he saw, and the three shallow openings on the North shore still exist, though one of them has nearly disappeared. Two cocoa-nut trees on the centre of the island, which Cook observes had the appearance of flags, are still waving; "the tower" at the western end is also there, but has increased to a large clump of cocoa-nut trees; a similar clump has sprung up at the eastern end. The lagoon is, in some parts, very shallow and contracted, and has many dry islets upon it. The shore is steep, as at the other coral islands, excepting on the South side, which should not be approached within a quarter of a mile.

Capt. Beechey speaks highly of the natives for integrity and good nature. He purchased a quantity of cocoa-nuts. The North extreme is in lat. $18^{\circ} 42' 26''$; the East extreme in lon. $138^{\circ} 43' 12''$.†

NARCISSUS or **CLERKE ISLAND**, or *Puka Puka*, or *Tatacoto*, was discovered by Bonecheo in 1774. It is described to be 4 miles in length and 1 mile broad; it is very low, and encloses a lagoon. The northern part is wooded; cocoa-nut trees are abundant; the southern part is only formed by a reef. M. Mauruc says that the inhabitants endeavoured to cut off (in 1839) the boats of a ship sent to communicate with them. Lat. $17^{\circ} 20'$, lon. $138^{\circ} 23'$.

ANONYMOUS ISLAND, according to M. Mauruc, from native information, lies in about lat. 17° S., lon. $138^{\circ} 40'$ W. It is said to be low and thinly inhabited.‡

MOLLER ISLAND, or *Amanu*, was discovered by Capt. Bellingshausen in 1829. According to him it tends N.E. by E. and S.W. by W., 17 miles in length, and is 7 miles broad. Its N.E. point is in lat. $17^{\circ} 43'$, lon. $140^{\circ} 37'$ W.

HARPE or **BOW ISLAND**, *Heyou* (Beechey), or *Ocheou* (Belcher), or *Eaoo*, was discovered by Bougainville in 1768, and was visited in the following year by Capt. Cook, who gave it its second name from the appearance of its shape, although the survey of it gives it a very irregular figure. For several reasons it is an interesting island. It was minutely surveyed and examined by Capt.

* Beechey, vol. i. p. 152.

† *Ibid.* vol. i. p. 154.

‡ Bull. Soc. Géog. 1848, p. 75.

Beechey, in the *Blossom*, in 1826, and was selected for the experiments on the nature of coral structures by Sir Edward Belcher.

By Capt. Beechey's trigonometrical survey, Bow Island is 30 miles long by an average of 5 miles broad. It is similar to other coral islands, confining within a narrow band of coral a spacious lagoon, and having its windward side higher and more wooded than the other; which, indeed, with the exception of a few clusters of trees and heaps of sand, is little better than a reef. The sea in many places washes into the lagoon, but there is no passage for a boat except that by which the ship entered, which is sometimes dangerous to boats in consequence of the overfalls from the lagoon, especially a little after the time of high water. It lies at the North side of the island, and may be known by two straggling cocoa-nut trees near it on the western side, and a clump of trees on the other.

The strip of low land enclosing the lagoon is nearly 70 miles in extent, and the part that is dry is about a quarter of a mile in extent. Capt. Beechey gives a minute description of the lagoon, the coral shelf, and the productions of this island. The lagoon produces abundance of shell-fish, and at that time great quantities of pearl oysters; and a vessel, the *Dart*, belonging to the Australian Pearl Company, was anchored in the lagoon and engaged in a successful fishery.* Capt. Beechey gives a sad picture of the degraded inhabitants, but Capt. Sir E. Belcher, in his visit in 1840, found them almost the reverse of this picture, and thinks that they may have been Chain Islanders.

Capt. Sir E. Belcher's later observations subjoined will be useful to the navigator in visiting this island.

"At the period of the *Blossom*'s visit the wind and current on his entrance as well as exit favoured him, but no sound conclusion or direction for navigators could be deduced therefrom. A fair wind out would be foul weather wind inside. In both cases, on reference to the *Blossom* and *Sulphur*, the winds at entrance and exit ranged from East to E.N.E., or leading winds.

"We found the time of exit or entry depended also on the time of high or slack water, and that it was necessary to watch this at the entrance, as the velocity of the ebb, when much water had been forced into the lagoon, prevented the ship from steering. It is at all times a difficult place to enter with a vessel drawing over 15 feet. It cannot be entered against the ebb without a breeze which would command 6 knots at least, as the current, which has 1 foot fall, runs above 4 knots.

"Approaching from seaward the state of the current can generally be pretty fairly estimated by the 'tail race,' which sweeps to sea about three-quarters of a mile. The instant this slackens or ceases the entrance may be approached. The starboard side close to the breaker is the boldest, but a rock near the inner point,

* Harpe or Bow Island, says M. Mauruc, has some mother-of-pearl. He fished for it six different times since 1831. Its eastern part is more wooded than the opposite. In about its N.W. part is a very narrow channel, in which $4\frac{1}{2}$ fathoms may be found at high water, and by which you may communicate with the lagoon. The current in it is sometimes so violent that there is the greatest danger in encountering the ebb tide. At least, if the breeze is not fresh, and the wind does not set well in, you ought to wait for the flood to enter. For want of this precaution M. Mauruc had to anchor twice in the passage, and then work in in the night by the aid of fires on either side. The inhabitants of this and of Moller Island are very friendly, and much united together.—*Bull. Soc. Géog.*, 1848, pp. 79, 80.

having only 9 feet on it, must be avoided. The two cocoa-nut trees over the western point, *clear* of the *bushes*, notes it, as well as one on the opposite side. These two rocks form the gateway of the channel, and as all the rocks are *plainly visible*, they are easily avoided."*

It had been stated that the tides in the Pacific did not follow the usual laws;† but the experiments carried on carefully by Sir E. Belcher disprove this. The tides on the *outer* reef conform to these laws, and the time of high water at full and change may be assumed at 2^h 40'; rise, 2 feet 9 inches.

The experiments of Capt. Sir E. Belcher in boring the coral on the inner side of the island were conducted with considerable difficulty, and proved, after 35 days' hard labour, and piercing to the depth of 45 feet, when the auger broke, that nothing but sand is found below 20 feet. The site of his labours is marked by seventeen cocoa-nut trees, 15 feet apart, planted nearly on the same line; on the nearest of which is a copper plate stating its locality.

The water obtained at Bow Island is not wholesome, unless for immediate consumption, perhaps scarcely for this. It is worthy of special attention to other navigators that the water obtained by digging within 4 feet of the flow of the sea, and allowed to settle, and then *rebaled*, was preferred by the natives and approved by Sir E. Belcher.

PRINCE WILLIAM HENRY or L'OSTANGE ISLAND, or *Négonégo*, was discovered by Wallis in 1765, though there is some discrepancy between his latitude and that of L'Ostange Island of Duperrey; but there remains little doubt, on an examination of their calculations, but that they are identical. Duperrey says that his island is about 5 miles long in an East and West direction, and its East point is in lat. 18° 43', lon. 141° 42'.

Lieut. Ringgold, of the U.S.S. *Porpoise*, passed through the channel between them, which he says is a mile wide, with no soundings. The southern island was surveyed; it has a bare reef on its S.E. and West sides, with a cocoa-nut grove on the South end. No entrance exists to the lagoon, and no natives were seen. The southern portion of the northern isle is a bare reef, with some high clumps of trees on the eastern side.‡

Capt. Beechey places the North extreme in lat. 17° 58' 20", lon. 142° 8', and the South extreme in lat. 18° 18' 10", lon. 142° 6' 45".

TWO GROUPS (*Morocao* and *Raouwahérté*, or *Manaka* and *Dawhaida*) were discovered by Cook in 1773. According to M. Mauruc they are very low, and each enclosing a lagoon. Communication can be made to the first in a canoe by a small passage situated in its E.S.E. part. Mother-of-pearl is found in it. They are separated by a channel which narrows very much in its western part, but still room enough for the largest ship to work. The people are very friendly. M. Mauruc says that being embayed under the land one morning, and having doubled several points with great difficulty, they were forced to take this channel, which they got through without any trouble.

BUYER'S GROUP (*Réhérétoua* or *Reitoue*), lat. 18° 20' S., lon. 143° 7' W.

* Voyage of the *Sulphur*, vol. I. pp. 384-5.

† See Williams's *Missionary Enterprise*.

‡ Narrative of the United States' Exploring Expedition, vol. iv. p. 265.

M. Mauruc says the existence of this group is contested, "many navigators having assured us that it did not exist. Some natives of the Pomotou Isles, which we questioned at different times, told us that they knew of but one of them; and nearly a year afterwards, in order to settle this question, we put our head towards the northernmost in lat. $18^{\circ} 0'$, lon. $143^{\circ} 2'$; at midnight it bore South from us about a mile off." *

BIRD ISLAND (*Reïtouroa* or *Hekueru*) was discovered by Cook in 1769. It is small and low, and encloses a lagoon. M. Mauruc, having been driven off by stress of weather, could not ascertain whether pearl shells could not be found, or whether it was inhabited (in 1840), though huts and some mats were to be seen. † Capt. Beechey places it in lat. $17^{\circ} 48'$, lon. $143^{\circ} 7'$.

MELVILLE ISLAND (*Scouerou* or *Tetukota*) was discovered by Capt. Beechey in 1826. He does not give any description of it. According to M. Mauruc it is very low, and enclosing a lagoon; a very small passage by which communication can be made by a small boat; some mother-of-pearl; no fixed inhabitants. ‡

ST. SIMON or RESOLUTION ISLAND (or *Taweree*) was discovered by Bonecheo in 1772, and named by Cook in 1773 after his ship. It has been examined by Beechey and by Wilkes. The latter says Taweree consists of two small isles, together about 4 miles in circumference; it has three clumps of cocoa-nut trees upon it, but of its South and West sides the greater portion is a bare reef.

M. Mauruc says it is small, low, and encloses a lagoon. No mother-of-pearl; but few cocoa-nut trees. There is a passage for a canoe nearly in the W.N.W. part; very few people, but very harmless. § Capt. Beechey places it in lat. $17^{\circ} 22' 20''$, lon. $141^{\circ} 24'$.

HUMPHREY ISLAND is placed among those of doubtful existence, by Admiral Krusenstern. Its position there given is lat. $16^{\circ} 52'$, lon. $140^{\circ} 30'$.

MERRILL ISLAND.—We venture to give this name to an island of doubtful existence, said to have been discovered by the American ship *Comboy*, whose commander, Capt. Harding T. Merrill, on his voyage from Oahu to Callao, in April, 1832, fell in with it in lat. $16^{\circ} 38'$, lon. $141^{\circ} 0'$ W.—(*Annales Maritimes*, Lima, May 13th, 1832; and *Nautical Magazine*, February, 1833, p. 66.) It is marked as inhabited. The natives have the stature and nut-brown complexion of the Sandwich Islanders, but did not appear to have such wild dispositions.

PREDPRIATIE ISLAND (*Kainga* or *Akahaïna*) was discovered by Kotzebue in the vessel (the *Enterprise*) whose Russian name he gave it, February 26, 1824. "The dazzling whiteness of the coral shore fringed a bright green ground, upon which rose a forest of palms; and we distinguished canoes moving upon a large lake in the centre of the island. Its greatest extent is only 4 miles from E.N.E. to W.S.W. Its centre is in lat. $15^{\circ} 58' 18''$ S., and lon. $140^{\circ} 11' 30''$; variation, 6° E." ||

It is called *Prince de Joinville* by Mauruc, who says it is low, and encloses a

* Bull. Soc. Géog., 1848, p. 83.—"They have been placed on the chart in lat. $18^{\circ} 0'$, and lon. $143^{\circ} 40'$, that is, $38'$ West of the two groups."—*M. Vincendon-Dumoulin*.

† Bull. Soc. Géog., 1848, p. 83.

‡ Bull. Soc. Géog., 1848, p. 82.

§ M. Mauruc, Bull. Soc. Géog., 1848, p. 81.

|| Kotzebue's Second Voyage, vol. i. pp. 109-10.

lagoon, where it is probable that mother-of-pearl may be found, for the natives wore it as ornaments. There appeared to be no opening into the lagoon, particularly on the North side. There are some cocoa-nut trees, but they are not very abundant. M. Mauruc says that in 1838, in endeavouring to effect a relationship with the natives, he very nearly had an outbreak.*

HONDEN or DOG ISLAND, by the natives *Henuake*, was discovered by Le Maire and Schouten, April 10th, 1616. They describe it as clothed with vegetation, and, from what they could judge, the greater part of the island was overflowed at high water. This is certainly not the case now, and therefore it appears to be somewhat raised. It is a coral island with a central lagoon, which can only communicate with the sea at very high tides, by means of two channels on opposite sides of the island; consequently the water in it is very salt and warm. The white coral shelf over which the sea flows at high water is 200 feet broad, the low water falling 2 feet below its surface; it is quite level, but there are many holes and large longitudinal cracks in it. The surf is very heavy on it. On the coral shelf lie many blocks of compact coral, just at high-water mark, extending beneath the coral sand; it is about 10 or 12 feet wide. The verdure, which at a distance seems to carpet the whole island, is in reality but a few patches of wiry grass, growing among the rugged coral debris with little sand or vegetable earth. The principal trees and shrubs are the pandanus (on the South side), boerhaavia, and pisonia. It is somewhat surprising that a few trees, 40 or 50 feet high, should have found sufficient soil to protect their growth. Most of the trees, however, are of stunted size, being not more than 10 to 15 feet in height, and 18 inches in diameter. There are no cocoa-nut palms on the island, as was reported by Capt. FitzRoy.

The number of birds found by Capt. Wilkes, who has surveyed it, was incredible, and they were so tame as to require to be pushed off their nests to get their eggs. The most conspicuous among them was the frigate bird, whose nests, constructed of a few sticks, covered many of the trees. The gannets, sooty petrels, and the beautiful tropic bird, also were in countless numbers. There were a great many very ravenous sharks, both in the lagoon and outside it.

No traces of inhabitants were perceived, nor is there any fresh water to be found. From the observations of the day, the usual neap tide is $3\frac{1}{2}$ feet, and it would give high water, at full and change of the moon, at two p.m. The centre of the island is placed by Capt. Wilkes in lat. $14^{\circ} 55' 40''$ S., lon. $138^{\circ} 47' 36''$ W.†

The DISAPPOINTMENT ISLANDS were discovered by Byron in 1765, but his position is nearly 4° to the West of the correct longitude, as ascertained by Capt. Wilkes, who appears to have been the first visitor subsequent to its discoverer, as suggested by Admiral Krusenstern.‡

The group consists of two islands, the easternmost *Wytoohee*, the other *Otohooh*. The N.W. point of Wytoohee, according to the Americans, is in lat. $14^{\circ} 9' 30''$ S.,

* Bull. Soc. Géog., 1848, pp. 77-8.

† Wilkes, American Exploring Expedition, vol. i. pp. 316-318.

‡ Wilkes, American Exploring Expedition, vol. i. pp. 319, 322, 357; Krusenstern, vol. i. p. 262; Supplement, p. 87.

lon. $141^{\circ} 17' 50''$ W.* The island is formed of islets, connected by a washed coral reef, of irregular shape, with a lagoon having many knolls in it, of various sizes, some 4 or 5 feet above the surface. The S.E. portion is the largest and most thickly wooded, and contains the greatest number of inhabitants. These were estimated to be about ninety in number, and understood the Tahitian language. They were peculiar, and appeared totally distinct from any others met with in the group, having strong wiry beards and mustaches, and a different physiognomy. They had evidently had communication with vessels, but had no idea of the principles of barter; iron was more prized than anything. The chiefs were of great age. The island has some cocoa-nut, bread-fruit, and pandanus trees; the pisonia, tournefortia, and the shrubs that are common to the low islands also grow on it.

No anchorage was found here. Water in small quantities is to be had on the eastern section of the island, and a little biche-de-mar might be taken on the reefs. A small rat was very troublesome to the natives.

The boats of the *Peacock* succeeded in landing on the East side of the island, where the coral reef shelves at about an angle of 10° , and having the wind blowing obliquely on it, there is comparatively little surf.

Otohoo, the other island of the group, lies W.N.W., distant $12\frac{1}{2}$ miles from Wytoohee, from which it is distinctly visible, like a round knoll. This appearance is owing to the trees upon it, for the land is as low as coral islands usually are. The superficial extent of the island is about a square mile; it has no lagoon, is well covered with trees, and has fresh water.

The inhabitants, computed at about fifty, were perhaps peaceable, but would not allow the party to land.†

ARAKTCHEEFF ISLAND, *Aataó*, *Nanataó*, *Ahangatou*, or *Maroupo*, was discovered by Bellingshausen in 1820. Kotzebue says that it bears so close a resemblance to Predpriatie that they might easily be mistaken for each other, if their relative positions were not exactly known. M. Mauruc was informed by the natives that the pearl oyster was to be found in the lagoon, and that they cultivated taro. He was attacked when a mile off by eight canoes, containing about thirty men, who were dispersed by a musket-shot.‡

Kotzebue's position is lat. $15^{\circ} 51' 20''$ S., lon. $140^{\circ} 50' 50''$ W.§

WOLKHONSKY ISLAND, or *Takurea*, or *Tacoumi*, was also discovered by Bellingshausen in 1820. It is low, and encloses a lagoon. People very harmless, and few in number. No passage communicating with the lagoon. Mother-of-pearl is tolerably abundant. Lieutenant Raper places it in lat. $15^{\circ} 38'$, lon. $142^{\circ} 6'$.||

BARCLAY DE TOLLY (*Roroia*), another discovery of Bellingshausen's, is in lat. $16^{\circ} 12'$, lon. $142^{\circ} 30'$. It is similar to Wolkhonsky, but larger. Little or no mother-of-pearl. Some cocoa-nut trees. People docile, and few in number.

* It may be observed that Capt. Worth made the centre of the West Island, Otohoo, in lat. $14^{\circ} 7' 8''$, lon. $141^{\circ} 21' W.$; and the centre of Wytoohee in lat. $14^{\circ} 10' S.$, lon. $141^{\circ} 8' W.$

† Wilkes, *American Exploring Expedition*, vol. i. pp. 323—325.

‡ Bull. Soc. Géog., 1848, p. 79.

§ Kotzebue's *New Voyage*, vol. ii. p. 111.

|| Bull. Soc. Géog., 1848, p. 81.

A passage somewhere, in which very large vessels may enter. Many sharks in the bay; safe anchorage.*

NIGERI or NIHIRU ISLAND was discovered by Capt. Bellingshausen in 1819. It lies N. $\frac{1}{2}$ W. and S. $\frac{1}{2}$ E. 7 miles in length. Its North point is in lat. $16^{\circ} 38'$, lon. $142^{\circ} 42'$.

HOLT or YERMALOFF ISLAND (*Otatna* or *Taenga*) was first seen by Capt. Turnbull, in the *Margaret*, in 1803. The second name, Yermaloff, or Jermeloff, was given to it by Bellingshausen in 1820. It is very low, and enclosing a lagoon, with which you may communicate by two passages, one in the N.E., which is the smallest, and the other in the West, where a vessel of 200 tons can easily pass. No pearl-shells, or but few; some cocoa-nut trees; it is sometimes inhabited by a few families.† It is in lat. $16^{\circ} 20'$, lon. $143^{\circ} 6'$ (Raper).

FURNEAUX ISLANDS (*Morotea* or *Maratea*) were discovered by Cook in 1773. They are very low, and enclosing a lagoon, which has mother-of-pearl in it. The northern part is wooded; the southern part is but a rocky flat, forming the belt. It is said that in the East part there is a passage through which a schooner at least might pass, but this requires confirmation. It is certain that you may always get into the lagoon. No cocoa-nut trees; few inhabitants.‡ It may be the same as the Good Hope discovered in 1822, though the position is very different. Lieutenant Raper places Furneaux Island in lat. $17^{\circ} 3'$, lon. $143^{\circ} 6'$.

TCHITCHAGOFF ISLAND, or *Tahanea* (*Tanée* or *Famia*), was discovered by Bellingshausen in 1820. Its South end is a bare reef, but there are trees on the East and West sides. Fires were seen by the American Expedition on the island. This, like all the other islands, has small islets around it, connected by low coral reefs, over which the sea in places washes.§ Lat. $16^{\circ} 45'$, lon. $144^{\circ} 36'$.

M. Mauruc says it is very low, and enclosing a lagoon, which may be entered by a tolerably large passage lying in the N.N.W. part. A little inferior mother-of-pearl; some cocoa-nut trees; occasionally inhabited.

CHAIN ISLAND (*Anaa* or *Anhar*) was discovered by Cook in 1769, and it was again seen in his second voyage in 1773. It is in lat. $17^{\circ} 23'$, lon. $145^{\circ} 38'$.

The principal seat of power in the low archipelago, or at least for a large portion of it, has been in this island; and its warlike inhabitants have carried their expeditions to all the islands West of Hau or Bow Island, and conquered them all.

Anaa or Chain Island, says Capt. Wilkes, is one of the smallest, yet it is the most thickly-peopled island of the group. It is said to contain 5,000 inhabitants, which large number is accounted for by the conquest of the other islands, and taking their inhabitants as captives. In estimating the total at 10,000 on the entire archipelago, it will be seen how few remain on the other islands in comparison with this number. The whole island is one cocoa-nut grove, and the principal food is fish and cocoa-nuts. The former is caught in large quantities in the lagoon. A great change has been brought about in the character of these islanders within the last twenty-five years, during which the Tahitian missionaries

* Bull. Soc. Géog., 1848, p. 82.

† M. Mauruc, Bull. Soc. Géog., 1848, p. 85.

‡ Bull. Soc. Géog., 1848, p. 84.

§ Narrative of the United States' Exploring Expedition, vol. iv. p. 267.

have been established at Anaa. Before this period the inhabitants were cannibals. Since the residence of the missionaries they have imbibed better tastes, and the christian influence has made them more peaceful. This change was first evinced by the treatment of their captives, whom they allowed to return, if they chose, to their own island; but very many of them had married at Anaa, and become permanent residents there, and few have taken advantage of the permission to return. Notwithstanding the numerous population, they are said to have an abundance of food. The people of Anaa still consider the inhabitants of the eastern islands as cannibals; but their statement in this respect is little to be depended on, for they have no communication whatever with those whom they class under this denomination, seldom extending themselves beyond Hau or Bow Island.*

DOUBTFUL ISLAND (*Tecocota* or *Tekareka*, *Equero*?) was discovered by Cook in 1773. It is about 3 miles long, very low, and enclosing a lagoon. Its East point is in lat. $17^{\circ} 20'$, lon. $142^{\circ} 23'$.

RAEFFSKOY ISLANDS.—In 1820 Capt. Bellingshausen discovered an island whose West extreme is in lat. $16^{\circ} 43'$, lon. $144^{\circ} 11'$, which he named as above. But later observations show that there are three islands, though not connected with each other, close enough to form a group. M. Mauruc says that he saw two of the islands, and was assured of the existence of the third, at the end of 1830.† In 1839 they were visited by the ship *Porpoise*, of the United States' Exploring Expedition, who called the three collectively the *Sea Gull Group*; but of course the merit of priority is due to Bellingshausen and to Mauruc.

Tepoto or *Elisa Island* of Mauruc, is the *Tipotu* or *Bacon Island* of Capt. Wilkes, and must be the Raeffskoy Island of Bellingshausen. It is the easternmost of the three.

Kiport or *Touanagué* of Mauruc, is the *Tuinaki* or *Reed Island* of Wilkes. It was found by the latter to be inhabited. The whole population consisted of twenty-five, men, women, and children, who had been sent a year before, by order of the queen of Tahiti, to raise food or productions useful to man, and who were planting cocoa-nuts (in pits) all over the island. These poor creatures seemed contented with their small, barren, and uninteresting spot. A small spring supplied them with water. Their village of six huts was extremely filthy.‡

Louise or *Ofti* of Mauruc, the *Clute* or *Ohiti* of Wilkes, is the southernmost. Like the others, it is small, and was uninhabited when M. Mauruc saw it in 1831. Its lat. is $16^{\circ} 49'$, lon. $144^{\circ} 20'$.

ST. QUENTIN or **CROKER ISLAND**, *Maraiiki* or *Feraïqui*, was discovered by Bonecheo in 1772, and was surveyed by Beechey in 1826. It is 4 miles long in a N.W. and S.E. direction; and its North point is in lat. $17^{\circ} 26'$, lon. $143^{\circ} 26'$.

ADVENTURE ISLAND, *Matutunga* or *Moutoutoua*, was discovered by Cook, in 1773. It is very low, and enclosing a lagoon; a small passage in the

* Narrative of the United States' Exploring Expedition, vol. i. p. 343.

† Bulletin de la Société de la Géographie, 1848, p. 86.

‡ Narrative of the United States' Exploring Expedition, vol. iv. p. 464.

North, fit for a boat ; a little mother-of-pearl ; some cocoa-nut trees ; occasionally inhabited.* Lat. $17^{\circ} 4'$, lon. $144^{\circ} 14'$.

PHILIPS ISLAND, or *Makemo*, was discovered in the *Margaret*, in 1803. It was called *Koutousoff Island* by Bellingshausen in 1820. According to the latter, it lies W.N.W. $\frac{1}{2}$ W. and E.N.E. $\frac{1}{2}$ E., 32 miles long, and 40 leagues in circuit. According to M. Mauruc it is very low, and encloses a lagoon, but has no mother-of-pearl, or at least very little ; the same of cocoa-nut trees ; there are some families ; the people docile. The lagoon can be entered by two passages, lying one in the N.E., and the other in the West part. The South part of the island is but a chain of reefs ; the North part is wooded.† Its West point is in lat. $16^{\circ} 27'$, lon. $144^{\circ} 1'$.

SAKEN ISLAND, or *Katiu*, was discovered by Bellingshausen in 1822. It is very low, and encloses a lagoon : two passages, one in the N.E., fit for large ships, the other in the West, but smaller, communicate with it. Some mother-of-pearl, a few pearls ; some cocoa-nut trees ; no fixed population.‡ Lat. $16^{\circ} 25'$, lon. $144^{\circ} 30'$.

MILORADOWITCH ISLAND, or *Faiti*, was discovered by Bellingshausen in 1819. It is 15 miles in length, in a W.N.W. and E.S.E. direction, and $5\frac{1}{2}$ miles broad. Its North extremity is in lat. $16^{\circ} 42'$, lon. $145^{\circ} 19'$.

WITTGENSTEIN ISLAND, or *Faarava*, or *Fakarawa*, is another discovery of Bellingshausen, at the same period as the last mentioned. It is still larger, being 32 miles long, N.W. by N. and S.E. by S., by $9\frac{1}{2}$ miles broad. We have no further account of these islands than that briefly given by Krusenstern in his *Memoires Hydrographiques*, the account of this Russian commander's circumnavigation not having been translated. The North point of this island is in lat. $16^{\circ} 4'$, lon. $145^{\circ} 39'$.

RARAKA was discovered on October 1st, 1831, by Capt. Ireland, of the brig *Adhemar*. It appeared, when first seen, to be a low island, thickly wooded. On the next day it appeared well covered with trees, not so high as cocoa-nut trees, of which latter, also, there were a few. It was calculated to extend 19 miles in an East and West direction. Like all other islands of the archipelago, it encloses a lagoon, which communicates with the sea by a narrow channel. The lagoon is of an elliptical form, and appears to be 10 or 12 miles long in a North and South direction. It was well known to the inhabitants of Otaheite, who carried on a pearl fishery there.§

It was visited by the American Exploring Expedition. " Nothing could be more striking than the difference that prevailed between the party of natives we met with near the entrance to the lagoon, and those of the Disappointment Islands, which we had just left. The half-civilization of the natives of Raraka was very marked, and it appeared as though we had issued out of darkness into light. They showed a modest disposition, and gave us a hearty welcome. We were not long at a loss to what to ascribe it : the missionary had been at work here, and his exertions had been based upon a firm foundation ; the savage had been changed into a reasonable creature. About 200 inhabitants were counted on

* M. Mauruc, Bull. Soc. Géog., 1846, p. 48.

† M. Mauruc.

‡ *Ibid.* p. 84.

§ Bull. Soc. Géog., 1832.

the island, most of whom belonged to Tahiti and Anaa or Chain Island, and were here on a shelling voyage. They live here in small portable huts. Here all shipwrecked mariners would be sure of kind treatment, and share of what few comforts these people possess.

"The result of our day's observations gave the tides, at full and change of the moon, two o'clock, and 3 feet in height. The shore, however, showed that there were at times very high tides. The natives said, when it was a round moon they had very high water.

"Some fresh water may be obtained here. The spring or pond is on the West side of the entrance. What the natives had in their cocoa-nut shells was fresh and sweet. It is, however, in no great abundance.

"The entrance to the lagoon is on the South side of the island, about one-third of its length from the western end. I place it in lon. $144^{\circ} 57' 40''$ W., lat. $16^{\circ} 6' 25''$ S. It is a narrow passage, but will admit a small vessel. The current runs very strong out of the lagoon, so much so that a boat cannot be pulled against it. The water in the entrance is from 5 to 8 fathoms deep, but there is no advantage in entering, as the reef is quite as steep within. A small vessel may anchor on the outside close to the shore. This island is nearly of the shape of an equilateral triangle, and its southern and eastern sides are formed by a submerged reef. It is 15 miles on each side." *

TAIRO, or TAI-A-RA, subsequently called King's Island, was discovered by Capt. FitzRoy in the *Beagle*, November 13, 1835.† It was surveyed by the American Exploring Expedition, October, 1839.‡ Capt. Wilkes's description of it is as follows:—"It is low, nearly of a circular form, and well covered with trees and shrubs, and has a lagoon of some extent. Its centre is in lat. $15^{\circ} 42' 25''$ S., lon. $144^{\circ} 36' 45''$ W. It was named King's Island after the man at the mast-head who first discovered it. After completing the survey of it, we landed on its lee side, where the water was quite smooth, and spent the afternoon in examining. There were no natives on it, but every indication that it had been inhabited recently by a party of pearl-fishers. The lagoon appeared to be well supplied with the pearl oyster. We found on the island two small springs of fresh water near its lagoon, and a good supply of cocoa-nuts. Many specimens of plants were obtained, and several interesting objects of natural history were added to our collections.

This island had more soil on it than any yet met with, and seemed to be productive. Large quantities of cocoa-nuts were lying about in heaps, no doubt gathered by those who had visited it before us.

"The width of the island to the lagoon was found to be 1,200 feet. A very narrow reef surrounded it, and the whole island was about 6 feet above the sea reef. No coral blocks were seen. It lies 20 miles to the N.E. of Raraka. The

* Wilkes, vol. i. pp. 325—332.

† Narrative of the Voyages of the *Adventure* and *Beagle*, vol. ii. p. 507; see also Bull. Acad. Imp. des Sciences de St. Petersburg, tome iv. No. 11, p. 3.

‡ Capt. Wilkes, supposing it to be a new discovery, gave it the name of *King's Island*. He states that it was not laid down in any chart, but it is laid down precisely in his position in the chart accompanying Capt. FitzRoy's Narrative. The same remarks apply to Cavahi, the Kawahe or Vincennes Island of Capt. Wilkes.

island is thickly wooded all round. An old canoe was found very much decayed and broken, and the remains of a hut on the beach."*

CARLS-HOF,† *Ovateia* or *Aratica* Island, was discovered by Roggewein in 1722. It was identified by Kotzebue in his second voyage. It is 8 miles in length and 5 in breadth, and its highest point, at the south-western end, is 12 feet above low-water mark, and is thickly wooded; it is therefore one of the most elevated of the low coral islands. Capt. Wilkes found about twenty natives on the island who have frequent intercourse with vessels visiting them; their village, composed of one or two huts built in a grove of large trees, consisted principally of pitonias 50 and 60 feet in height; the woods being quite thick and forest-like. The lagoon abounds with fish, and has several small coral knolls in it, though none with vegetation on them; the lagoon has a deep entrance on its West side.

Fresh water is procured from a large pool about 50 feet in diameter, and of considerable depth; it is about half a mile from the village to the North, and situated within the line of woods. Watering is very troublesome and fatiguing when the boats are outside, but boats can approach very near the pool by entering the lagoon; there would be some difficulty in entering when the tide is setting out. The water, which some thought a little brackish, but quite potable, is ample to supply a squadron. The reefs are covered with holothuria and some biche-de-mar, but none of the valuable kinds. The fish here is said to be poisonous, but the natives eat some kinds, so that it is not all so.

The West point of the island was determined to be in lat. $15^{\circ} 26'$ S., and lon. $145^{\circ} 39' 46''$ W.‡

CAVAHI, or KAWAHE, or *Vincennes Island*, is a lagoon island discovered by Capt. Fitzroy in the *Beagle*, November 13th, 1835. He says it is a much larger island (or rather group of islands) than Tairo. He saw a number of islets covered with cocoa-nut trees, surrounding a lagoon, but could not delay to examine the South side.§

Capt. Wilkes, in the American Exploring Expedition, supposing it to be a new discovery, 1st September, 1839, named it after his ship. His account of it is as follows:—"We landed on Vincennes Island, and obtained the usual observations. Its South point is in lat. $15^{\circ} 59' 48''$ S., lon. $145^{\circ} 9' 30''$ W. It was found to be 16 miles long by 10 miles wide; its greatest diameter lying North and South. It is a narrow, annular ridge, consisting of many blocks and slabs of coral, which give a clinky sound when struck. The coral shelf seemed to dip in one place at an angle of 15° , forming a ridge, which was so low that the tide was beginning to flow over it before high water. There is an opening into the lagoon on the S.W. side; on its south-eastern part is a high clump of trees, looking like a knoll at a distance. The rest of the island is covered with a growth of bushes, 10 or 12 feet high. The blocks and slabs above spoken of were very much waterworn, and were strewn about on the coral shelf. This, where I measured it, was 500 feet wide, but it is not of equal width in all parts. Among

* American Exploring Expedition, vol. i. p. 325.

† Carls-Hof, i. e., the Court of Charles.

‡ Wilkes, American Exploring Expedition, vol. i. pp. 333—335.

§ Narrative of the *Adventure* and *Beagle*, vol. ii. p. 508.

the coral rocks was some sand, and in many of them were found large specimens of the chams and other shells. I was informed at Raraka that there were a few inhabitants on Vincennes Island, but none were seen by us. They were said to live on the southern end of it."*

PALLISER ISLANDS are the *Schadelyk* or *Pernicious Islands* of Roggewein, 1722. This group is mentioned but slightly by Cook, who named them after his worthy friend, Capt. Palliser. Kotzebue made a closer examination of them. "The group consists of a number of small islands, connected by coral reefs, which form a circular chain, and enclose a large area of water. When we had reached the southern point of the East Palliser, we saw ridges stretching 10 miles westward to two small islands, and then, taking a northern direction, united at a considerable distance from the larger ones.

"Cook, from his own account, did not approach near enough to see this ridge, and from a distance mistook the two little woody islands it embraces for the most southerly of a distant cluster, which he calls the *fourth* group of the Palliser Islands. I can maintain that there are only three such groups. The above-mentioned two small islands on the reef lay directly North, and the southern part of the first cluster of the Pallisers was no longer visible. Viewed from this spot the smaller ones might have been mistaken by us also for part of another group, if we had not previously ascertained that they were connected with the first by means of the reef."

The different members of the group are all separately distinguished, as indeed they have no further connexion with each other than their proximity.

TOAU or ELIZABETH ISLAND is about 24 miles in length, and has anchorage, according to Capt. FitzRoy's chart, on its West side. Its West end is in lat. $15^{\circ} 58'$, lon. $145^{\circ} 48'$.

AURA or KAUKURA ISLAND is about the same extent and character as Elizabeth Island. Its West point is in lat. $15^{\circ} 43'$, lon. $146^{\circ} 48'$.

HAGEMEISTER, or *Opatiki*, or *Opatagué*, according to M. Mauruc, is a small island discovered by Capt. Hagemeister in 1830. It is scarcely above the surface of the water, and lies between the first and fourth group of the Palliser Islands. Admiral Krusenstern is disposed to believe that this was the reef on which the *Margaret* struck in 1803, and that in the interval it had acquired the character of an island instead of a submarine reef, from the growth of the coral.† According to Wilkes's chart it is in lat. $15^{\circ} 18'$, lon. $146^{\circ} 12'$.

The RURICK ISLAND of Kotzebue is the *Arutua* of Wilkes. It is 20 miles in extent, N.N.E. and S.S.W. It has no channel into the lagoon. Its North point is in lat. $15^{\circ} 10' S.$, lon. $146^{\circ} 47'$. Capt. Wilkes's party attempted a landing at several places in the boats. One of them succeeded near a cocoa-nut grove, but the two that went to land at the village found the surf too high to attempt it.‡

ROMANZOFF ISLAND, *Tike* or *Manou*, was discovered April 20th, 1815, by Otto von Kotzebue, and was named after the munificent author of his voyage. He describes it as a small coral island, 3 miles long, N.N.E. and S.S.W.; its

* Narrative of the American Exploring Expedition, vol. i. p. 332.

† Krusenstern, Supplement, p. 94.

‡ Narrative of the American Exploring Expedition, vol. i. p. 344.

whole circumference being not more than 10 miles. It is particularly distinguished by having no lagoon, like most coral islands. It is in lat. $14^{\circ} 57' 20''$ S., lon. $144^{\circ} 35'$.*

KING GEORGE ISLANDS.—This name is applied by Cook to two islands which had, however, been previously discovered. It may be the *Sondergrond* of Le Maire and Schouten, 1616. The N.E. island, *Tiookea* or *Taroa*, was seen by Roggewein, in 1722. It is 15 miles long E.N.E. and W.S.W.; its North point being in lat. $14^{\circ} 22'$ S., lon. $144^{\circ} 58'$ W.

Oura or *Taputa* is the S.W. island, and is 12 miles long N.N.E. and S.S.W. It was seen by Byron in 1765, and is called *Spiridoff* by Kotzebue. Its South point is in lat. $14^{\circ} 44'$ S., lon. $145^{\circ} 20'$.

They appeared to Capt. Hudson, of the American Expedition, to be well inhabited, and have entrances to their lagoons on the West side. The native names of the two islands, according to him, are *Tiookea* and *Oura*. The S.W. of *Tiookea* is in lat. $14^{\circ} 31' 12''$ S., lon. $145^{\circ} 9' 30''$ W. *Oura* bears S. 68° W., distant $4\frac{1}{2}$ miles.†

WATERLANDT ISLAND, or *Manhii*.—In 1616 Le Maire and Schouten discovered an island 15 leagues to the West of *Sondergrond*, which latter Admiral Krusenstern considers identical with the King George Islands.

In 1767 Capt. Wilson, in the ship *Duff*, also saw an island in the above situation, and to which his name is given.

In 1830 Capt. Hagemeister discovered an island in the above relative situation. Capt. Duperrey places *two* islands to the West of the King George group; a second to the S.W. of the former, and the track of Turnbull between the two.

In Capt. FitzRoy's chart these two islands are placed in the foregoing positions, so that which is Le Maire's Waterlandt, and the island seen by Wilson, has to be decided. Krusenstern considered that the latter was one of the King George's Islands. Capt. Duperrey thought the contrary, but without convincing Admiral Krusenstern. The discovery of the second island decided in favour of Duperrey.‡ These two islands were more correctly placed and surveyed by Capt. Wilkes in 1839. Their native names are *Manhii* and *Ahii*; they lie $8\frac{1}{4}$ miles W. $\frac{3}{4}$ N. and E. $\frac{3}{4}$ S. asunder, from reef to reef.

Manhii is in all probability the Waterlandt of Schouten and Le Maire, and also Wilson's Island of the *Duff*. There is a large and deep entrance at the S.E. end into the lagoon of *Manhii* Island, in which the natives informed me vessels had often anchored whilst engaged in pearl fishing. Many cocoa-nut trees were seen on the island, and fresh water is to be procured on the S.W. side. The island at this end is upwards of half a mile wide to the lagoon; the coral reef is here quite broad. Soundings are not to be had with 100 fathoms of line 50 feet from the edge of it.

There were some small compact coral rocks here and there, but no regular

* Voyage of the *Rurick*, vol. ii. p. 295.

† Narrative of the United States' Exploring Expedition, vol. i. p. 342.

‡ See Krusenstern, Supplement, p. 93; Bulletin de la Soc. Imp. Scien. de St. Petersbourg, vol. iv. No. 11, p. 5; and Wilkes, vol. i., Appendix, p. 357.

upper or second shelf; the lower coral shelf was 300 feet in width, and had many long longitudinal cracks, from 6 to 8 inches wide, resembling those seen in ice fields; in some places these were quite deep, and in the chasms numerous shells of the chama species presented to our view their beautiful colours. Some of the gentlemen reported that they found a stone sarcophagus, or something much resembling one.

The East end of the island lies in lat. $14^{\circ} 26' 22''$ S., lon. $146^{\circ} 4' 20''$ W.*

PEACOCK ISLAND, or AHII, is not inhabited, and has only a small boat entrance into its lagoon on the West side. The coral belt is similar to that last described; it was found to be upwards of half a mile in width, and was covered with the same kind of vegetation as the last, excepting cocoa-nut trees, of which none were found on the island. The lagoon is quite shallow; a favourite fish with the natives is found in it, and at certain seasons they visit the island for the purpose of catching them. The coral shelf varied from 200 to 500 feet in breadth. It was named after the *Peacock*, to show that its position was correctly ascertained by the Exploring Expedition.† West point, lat. $14^{\circ} 35'$, and lon. $146^{\circ} 27'$.

VLIEGEN, PRINCE of WALES or DEAN ISLAND, or NAIRSA.—On April 18, 1816, William Cornelison Schouten and Jaques Le Maire, in the *Unity*, after rounding Cape Horn and touching at Waterlandt, &c., discovered an island, on which they landed, and were assailed by myriads of a sort of black fly, as has been alluded to on page 844, which soon made them quit it, and apply the name of *Fly* (Vliegen) *Island* to it. This is the extensive island in question. The next name is derived from Commodore Byron, who, in 1765, described Prince of Wales Island as 20 leagues in length. In 1803, the ship *Margaret* reached an island which they called *Dean Island*, but which there is no difficulty in proving is the same.

The very great extent of this island has led to considerable confusion in the early charts and claims to discovery. Thus Roggewein, after having discovered Aurora Island, at daybreak discovered *Vesper Island*, which is considered by Admiral Burney and others to be a portion of the extensive chain of islands constituting Vliegen Island. Another difficulty, too, has been cleared up by more recent discoveries: Roggewein states that he sailed *through* some passages through the reefs of an extensive archipelago, which he calls the *Labyrinth*, but which must lie to the West of the western extreme of Vliegen Island. The discovery of Krusenstern Island by Kotzebue in 1816, and Lazareff Island by Bellingshausen in 1820, has shown that these must form a portion of this hitherto unexplained labyrinth.

Several navigators have coasted around this island, but none have described it very fully.

It was found by Capt. Wilkes to be 66 miles in length. Its West point is in lat. $15^{\circ} 5' 15''$ S., lon. $147^{\circ} 58' 34''$ W. The natives acknowledged themselves subjects of Queen Pomare of Tahiti, and were very desirous that we should land. They brought off a few shells, and told us they had many fowls, pigs, taro, &c.

* Narrative of the American Exploring Expedition, vol. I. p. 336.

† Vol. I. p. 367.

There are several islets in the lagoon covered with trees. Vast numbers of large blocks were seen lying on its reef. The shore reef is not more than 200 feet wide, and is composed of only one shelf. The passage between its West point and Krusenstern Island was found $12\frac{1}{2}$ miles wide, and free from all danger.*

CÉCILE ISLAND is marked on M. Vincendon-Dumoulin's chart as low, and in lat. $15^{\circ} 30'$, lon. $148^{\circ} 20'$. Can this be the Vesper of Roggewein?

AURORA or METIA ISLAND was discovered by Roggewein in 1722. Its North end is placed by Capt. Wilkes in lat. $15^{\circ} 45' 39''$ S., lon. $148^{\circ} 13' 15''$ W.

"It was totally different in appearance from those we had met with, though evidently of the same formation. It was a coral island uplifted, exposing its formation distinctly, and as such was very interesting. On approaching its eastern end I sounded at about 150 feet from its perpendicular cliff, and found no bottom with 150 fathoms of line. The cliff appeared worn into caverns. We landed close in its neighbourhood, and on measuring its height it proved to be 250 feet. The coral shelf was found to be 500 feet in width, extending on the North side of the island, and gradually diminishing in width until it loses itself at the western end. This island has all the features that one would naturally be led to expect from a low island uplifted. The North, East, and West sides present a perpendicular cliff or wall, but this character does not prevail on the South side, although it has some high knolls. The North ridge is nearly level, and there is a break through it (by which we ascended to its top) very much like the opening of a lagoon. The North side is concave, and there is found within the indentations between its two points an extensive inclined plane, composed of large masses of limestone and vegetable mould, on which the village is situated, in a luxuriant grove of bread-fruit, cocoa-nut, pandanus, and other trees, similar to those already spoken of as seen on the other islands. There were several copious springs, but the natives informed me that there were no running streams on the island. On reaching the top of the bluff we found ourselves in a wood, and wishing to get a view of the interior, we made for the East end, passing occasionally over beds of clinky coral, thrown and scattered in all directions; after a walk of more than a mile we came to an open space, from which we had a clear view of the interior of the island, which was found to be densely covered with trees. The general shape, as far as could be seen, was pan-like, or in the form of a dry lagoon.

"This island was particularly interesting, from its combining both high and low vegetation; and a very considerable number of plants was obtained. As far as our observations went, the upper portion of this island is composed of limestone or compact coral rock, and it has unequivocal marks of having been uplifted at different periods; the cliff, at two different heights, appears to have suffered abrasion by the sea.†

"The inhabitants appeared to have derived very great improvement from the missionaries; in times past they had all war, but now all was peace. Abundance

* Wilkes, vol. i. p. 337.

† Capt. Hudson sounded with the deep-sea thermometer, when within a mile of the island, in 600 fathoms; the temperature at the surface of the water was $80\frac{1}{2}^{\circ}$, that below $44\frac{1}{2}^{\circ}$.—*Ibid.* p. 342.

of fruit and vegetables could be purchased. I left the island under the impression that this little community was a happy and contented one. I was glad to get off, in order to be freed from the flies, which are in incredible numbers on all the inhabited islands, and are a great nuisance."*

KRUSENSTERN ISLAND, or *Tikehaa*, was discovered by Kotzebue, April 24th, 1815. It is of the usual description, the island chain extending from N.N.W. to S.S.E., 15 miles in length, and particularly distinguished by having in the middle of the lagoon a small island thickly overgrown with trees. The middle of the group is placed in lat. 15° S., lon. $148^{\circ} 41'$ W.

LAZAREFF ISLAND, or *Malivi*, or *Mataiwa*, is the westernmost of the islands of the Low Archipelago, and was discovered by Bellingshausen in 1820. There is no passage through the reef. It has some trees on it, among which the cocoa-nut may be seen; and is uninhabited. Its length is 5 miles, and the West point is in lat. $14^{\circ} 55'$, lon. $148^{\circ} 45'$.

CHAPTER XXIV.

SOCIETY ISLANDS.

THIS important group of islands, which in some respects is the principal of the South Pacific, consists, as is well known, of the celebrated Island of Tahiti and several other smaller dependants. There is no spot on the globe which has received a more lively attention than this, from the great experiment of the civilization of man by means of religious influence. The details of this are familiar to most, and form a universal theme with all writers on the human race. The islands themselves are not so important to the rest of the world; perhaps from the numerous surrounding lands which also afford the necessary rest and refreshment required in the long Pacific voyages. The Sandwich Islands, in the northern hemisphere, stand more alone, and thus enact a more conspicuous part in maritime and commercial affairs than the southern group.

There would appear to be little doubt but that Tahiti was first seen by the expedition under Pedro Fernandez de Quiros, in 1606. This voyage has, as it ought to be, become one of the most famous ever performed; inasmuch as the discoveries made in it have been verified by subsequent observations, which have identified many of the points otherwise obscure and doubtful in the imperfect narratives which have been transmitted of them.

It would appear that Quiros went as pilot mayor in Mendaña's famous expedition across the Pacific, in and subsequent to 1595, and on his return obtained of King Philip III. an order from the Conde de Monterey, viceroy of Peru, to

* Capt. Wilkes, vol. i. pp. 337—341.

furnish him with two ships for the purpose of extending the former discoveries. Two ships, Quiros commanding the first, and Luis Valz de Torres, the *Almiranta*, the second; besides, there was a small vessel called a zabra.* They left Callao December 21st, 1605, and after making several discoveries, previously alluded to, on February 10th, 1606, the weather being rainy, "they saw a low island, with a point to the S.E., which was covered with palm trees." Smoke arose from different parts, showing that it was inhabited. They could find no anchorage. They then endeavoured to work to windward of the S.E. point, but could not: the zabra then approached and anchored in 10 fathoms, near the shore. Their boats could not land, but a bold young Spaniard, Francisco Ponce, stripped and swam ashore, where he was very kindly received by the natives. Three other Spaniards followed him, and experienced the same kind treatment. They got safely off again, and the next day a party contrived to land at a place, from whence, after walking some time, they reached another bay of still water, which is on the other side of the island. They communicated further with the natives, and left the island on the 12th of February. This island has no name in the account given by Torres or by Torquemada, but in the list of Quiros it is called *La Sagittaria*. Almost all particulars coincide with that of the large and important island now under consideration.† Quiros must therefore have the honour of discovering Tahiti.

To conclude the discovery of Quiros in this group, after quitting it he found a low island, in parts overflowed by the sea, the situation of which exactly coincides with that of Teturoa, 10 leagues to the northward of Tahiti. He then bore away towards the New Hebrides.

Like many other Spanish discoveries, this was unknown or unnoticed by the rest of the world, so that when the ship sent by George III. to make discoveries in the South Seas, the *Dolphin*, under Capt. Wallis, reached Tahiti, on June 19th, 1767, it was supposed to be the primary discovery, and it was named *King George Island*. He made it on the S.E. side, and was soon surrounded with a great multitude of canoes, the natives being very friendly, but thievish, which led to a slight skirmish. Capt. Wallis sailed along its eastern side, and anchored off its N.E. shore. On the 23rd he weighed, and discovered Matavai Bay; and, in passing it, struck on the detached coral bank, now called the *Dolphin Bank*, remaining immoveable, and in imminent danger for above an hour. They, however, got safely off, and anchored in the bay, when Lieutenant Furneaux landed, and took formal possession in the name of George III., by hoisting a flag.

* There are several accounts of this expedition; the earliest is in the *Monarquía Indiana*, lib. v. cap. 64, *et seq.* Torquemada is the author of it. Quiros also gave some particulars in his *Memoriales*, published in Dalrymple's Collection, vol. i. pp. 145—174. Torres also has related the particulars of it; see Dalrymple's Collection, and more particularly Burney's Collection, vol. ii. p. 268, *et seq.*

† One important particular would lead to a different conclusion. It is called a low island, *isla rasa*, or rather the S.E. part first seen, perhaps imperfectly. Tahiti, it is well known, is very lofty in the centre, low only near the shores. One point has been overlooked by Burney and Dalrymple. On the morning after they made the land they were mortified to find that they had drifted *eight leagues* to leeward, but could see that they were still abreast of the island; this could not be the case if it had been only a low island. The zabra also anchored in 10 fathoms, which could not be done off a coral reef. The place of landing of the ship's company exactly coincides with the description of the low and narrow isthmus connecting the two peninsulas. Another objection is, that the high Island of Eimeo is not mentioned, though it is visible from the East side of Tahiti.

This ceremony has been continued since the time when the Pope claimed all countries inhabited by heathens. The flag was soon taken down by the natives, and was made by them into a badge of sovereignty for many years afterwards.

On April 2nd, 1768, M. de Bougainville came hither in the *Boudeuse* frigate and a store-ship. He was deterred from doubling what is now known as Point Venus, by the appearance of the reef which surrounds it. They therefore were under the inconvenience of anchoring on the windward side of the island, which they quitted on the 14th, naming it *Nouvelle Cythère*. After this a revolution occurred in the government of Tahiti, the effects of which became permanent.

The next visit is perhaps the most important, as it made the world much more intimately acquainted with this group than those previously, and besides filled up one of the most important vacancies of science, that of obtaining a more complete knowledge of the figure of the earth. It had been recommended by the learned of Europe that the rare occurrence of the transit of Venus across the sun's disc should be observed at points the greatest possible distance apart. For this purpose Lieutenant James Cook, who from his great ability had been promoted, was sent in the *Endeavour*, with an efficient staff of scientific observers, among whom was Mr. (afterwards Sir Joseph) Banks, to Wallis's discovery, arriving at Matavai Bay April 12th, 1769. A small fort was erected near the northernmost point of the island, and the transit observed on June 3rd following: the point thus becoming one of the then best-determined positions in the western hemisphere, and was named Point Venus. Cook surveyed the chief island, and discovered several of the north-western group, to which he gave the appellation of Society Islands.*

The occupation of the Falkland Islands in 1765-66, led the Spanish government to suspect that the English would establish themselves in the South Seas; and these notions were confirmed by the publication of Wallis's and Cook's voyages in 1771. Accordingly orders were sent to Don Manuel de Amat, viceroy of Lima, to forward an expedition to Tahiti. Don Domingo Bonecheo was accordingly sent, in the *Aguila* frigate, reaching Tahiti November 10th, 1772. He gave it the name of *Amat* or *Tagiti*. His report, on returning, caused the attempt to colonize; for in September, 1774, Bonecheo was again sent, with two Franciscan missionaries, and other means of establishing a settlement.

Between these visits Cook had, in company with Capt. Furneaux, in the *Resolution* and *Endeavour*, again visited the island, August, 1773, and heard of the Spaniards' visit, though he mistakes the commander.

Capt. Bonecheo made a minute examination of the island, but unfortunately died, January 26th, 1775, and was buried at the foot of a cross they had erected on first landing. The ships returned, leaving the missionaries, &c. In a few months the viceroy, anxious for the success of his mission, again despatched the *Aguila*, this time under Don Cayetano de Langara, arriving there early in November, 1775; but the missionaries would not be left behind.†

* The accounts of Wallis's and Cook's first discoveries are given in Hawkesworth's Collection, vol. i. p. 434, *et seq.*; and vol. ii. p. 182, *et seq.*

† The accounts of these Spanish voyages were for many years hidden in much mystery, but full narratives of them had been transmitted to Spain. A translation of the narrative of that in 1774

Cook visited it in his last voyage, in August, 1777, and found the house, cross, &c., of the Spaniards, carefully preserved.

During the voyages and visits which have been thus alluded to, the whole of the islands had been pretty closely examined, and were consequently well known, and placed on the charts: it is needless to enter more into details respecting the progress of these discoveries; the relation of the facts is sufficient. We have been more diffuse on this, as it is one of the most interesting points of Pacific discovery.

The subsequent events which distinguish Tahiti stand prominent, and are familiar to most. Eleven years passed after Cook's last visit without any intercourse between Europe and Tahiti. The *Lady Penrhyn*, on board of which was Lieutenant Watts, who had sailed with Cook, touched here July 10th, 1788. This vessel was employed in transporting convicts to the new colony of Botany Bay. Soon after this Lieutenant Bligh, who had also sailed with Cook, as master, came hither in command of the *Bounty*, which was commissioned by George III. to transport the bread-fruit tree to the British West India Islands. She arrived at Matavai October 26th, 1788, and her five months' sojourn allowed the crew to form connexions with the native women. This has been assigned as a sole reason for the ensuing catastrophe, but it is more to be attributed to the commander's harshness and severity. The subsequent mutiny and return of the mutineers to Tahiti, June 6th, and a second time September 22nd, 1789, is well known.

The *Pandora* frigate, commanded by Capt. Edwards, was sent in search of the *Bounty* and her mutineers, and arrived here March 23rd, 1791, and took away those who had remained, fourteen in number, three of whom were afterwards executed at Spithead. Vancouver also visited Tahiti in this year. Thus most of the great voyages to which we owe our first knowledge of the Pacific Islands have made this one point. Capt. Bligh arrived at Tahiti in the *Providence*, April 7th, 1792, to complete the project which had been previously frustrated.

Without enumerating the other vessels which have touched here, but not adding to our previous stock of knowledge, we come to a different order of visits, attended with more permanent results.

The foregoing voyages, made by order of George III., excited wonderful attention in England, and one result of them was the formation of a missionary society in London, whose first operation was the outfit of a vessel, the *Duff*, which was to carry missionaries and the Bible into these newly-discovered lands. The *Duff* sailed from the Thames, August 10th, 1796, and, after visiting the groups to the eastward, arrived at Tahiti, Sunday, March 5th, 1797. The progress, success, and establishment of this first missionary effort are familiar to most. The natives, by a singular train of political circumstances, acknowledged the sway of the Europeans, and although some dissentients existed among the higher authorities, yet the missionaries held almost paramount sway over the government and policy of Tahiti.

appeared in the *Bulletin de la Soc. de Géog.*, March, 1834; also in tome iv. 1839, p. 69. Sir Woodbine Parish gives some further information from a Spanish MS. in the *Journal of the Royal Geog. Society*, vol. iv., 1834, part ii. p. 186. A curious Spanish MS. is also in the library of the *Royal Geog. Society* on the same subject.

Perhaps the very success of these missions led to their downfall. Without advancing too far on the very delicate ground which made the policy of the missionary leaders a national question, it may be fairly considered that the French interposition was not so unwarrantable as it has been endeavoured to be shown. The exclusive system introduced, and the harsh and intolerant measures proposed and effected, carried their own retribution. The success of the French mission in the Gambier Islands, and other places, induced the Romish propagandists to send two priests, MM. L. J. Laval and F. Caret, to Tahiti, in order to establish their rule of faith in these islands. This was fiercely opposed by those at the head of the existing order of theological opinions, and the consequence was, that these two persons, with a third, A. Vincent, a carpenter, were forcibly deported from Tahiti. This aggression against French subjects naturally drew down the vengeance of the government; and the frigate *La Venus*, under Admiral Du Petit Thouars, arrived and demanded 2,000 piastres as the expenses of their voyage to France,—perhaps a *little* act for a great nation,—and obliged Queen Pomare to sign a treaty which allowed liberty to all French subjects. This was in 1842.* The ice once broken, and the French power having been established in the Marquesas, it was not difficult to find a pretext to lay stronger hold on this important island, in some points the key of the Pacific. After various controversies, backed by the presence of a powerful fleet, Capt. Bruat, early in January, 1844, landed a strong force, and hauled down Queen Pomare's standard, and hoisted the French flag, taking possession of the island in the name of Louis Philippe, the king of the French. The English commander of H.M.S. *Dublin*, Capt. Tucker, protested against this, and the queen, who was to have been arrested by the French, subsequently sought protection and a home in H.M.S. *Basilisk*. The next procedure was the arrest of Mr. Pritchard, the missionary, who had played a conspicuous part in the former régime, on February 13th. On May 18th, the French attacked the position taken by the adherents of Pomare, and a fierce battle ensued, in which the French had the worst of it. This warfare continued for several weeks, until the French power was entirely established, and Pomare retired to Raitea.

In the abstract French protection is but a *name*; their power is absolute, and, in a few years, there will be no evidences of the years of labour and expense bestowed in rendering this beautiful island and its people civilized in an English sense.†

The NATIVES have been so very frequently described that it is needless to say much here. They will not compare with those of the Sandwich Islands, neither will Tahiti itself with the latter for commercial activity or importance. Blessed

* The relation of all the circumstances in which Du Petit Thouars was engaged is given in the Account of the Voyage de *La Venus*, tome ii. p. 438, *et seq.*

† The French keep their Sunday, which is a day *before* that usually and formerly kept. The missionaries came round the Cape of Good Hope, and thus lost a day to what it would have been had they rounded Cape Horn. The introduction of a new mode of worship among these simple islanders will naturally have a considerable effect on their character. Mass is celebrated with much form, and the beautiful military band which takes its part in the religious services is a most attractive feature with the Tahitians, and will make many converts. It is to be feared that a few years of French domination and laxity, and Roman Catholic ceremony, will obliterate the effect that years of Protestant missionary labour has made.

with a singularly beautiful climate and a fertile soil, their natural wants are almost supplied from the spontaneous productions of the earth. Thus they are indolent and luxurious, easily susceptible of external impressions. Perhaps the missionary system imposed upon them by their late exclusive teachers was not best adapted to their mental and corporeal natures. Notwithstanding the very vast amelioration which was effected in their former licentious and cruel character, it may be doubted whether the outward show was not in too many cases belied by their private lives. Now, however, the scene is changed. The system of the French has released them from their former strictness, and this it must be deemed is more in accordance with their natural feelings, and beyond question will rapidly effect another great change in their character as a nation.

One very startling fact is prominent in their history. When Cook stayed here in 1774, he judged from the number of canoes which visited him that Tahiti contained 200,000 people, and this large number has been even exceeded in the estimates of some other visitors, but without doubt it has been much overrated.* From whatever cause, or combination of causes, that may have been in operation, it is certain that there are not more than 9,000 or 10,000. It has usually been considered that infanticide, and the peculiarly licentious society of the Areoi, were the most effectual in reducing the population in the earlier periods of our acquaintance. According to a census taken about ten years since, there were 9,000 on Tahiti, and 1,000 on Eimeo.

CLIMATE and WINDS.—In the prefatory remarks in the preceding chapter we have cited some observations by Capt. FitzRoy, as to the variableness of what would be expected to be the regular trade winds in this latitude. The ensuing extract from the narrative of the first voyage made by the great circumnavigator Cook, in 1779, places the matter in a clearer light, and appears conclusive.

“Though this and the neighbouring islands lie within the tropic of capricorn, yet the heat is not troublesome, nor did the winds blow constantly from the East. We had frequently a fresh gale from the S.W. for two or three days, and sometimes, though very seldom, from the N.W. Tupia reported that south-westerly winds prevail in October, November, and December, and we have no doubt of the fact. When the winds are variable, they are always accompanied by a swell from the S.W. or W.S.W.; there is also a swell from the same points when it is calm, and the atmosphere loaded with clouds, which is a sure indication that the winds are variable, or westerly out at sea, for with the settled trade wind the weather is clear.

“The meeting with westerly winds within the general limits of the eastern trade has induced some navigators to suppose that they were near some large tract of land, of which, however, I think they are no indication. It has been found, both by us and the *Dolphin*, that the trade wind in these parts does not extend farther to the South than 20°, beyond which we generally found a gale from the westward; and it is reasonable to suppose, that when these winds blow strong, they will drive back the easterly wind, and consequently encroach upon the

* A much more detailed estimate was formed by the first missionaries in 1797, and their calculation was 16,060. *Vide Voyage of the Duff*, p. 213.

limits within which they constantly blow, and thus necessarily produce variable winds, as either happens to prevail, and a south-westerly swell. This supposition is the more probable, as it is well known that the trade winds blow but faintly for some distance within their limits, and therefore may be more easily stopped or repelled by a wind in the contrary direction; it is also well known that the limits of the trade winds vary not only at different seasons of the year, but sometimes at the same season in different years.

“There is therefore no reason to suppose that south-westerly winds, within these limits, are caused by the vicinity of large tracts of land, especially as they are always accompanied with a large swell in the same direction in which they blow, and we find a much greater surf beating upon the shores of the S.W. side of the islands that are just situated within the limits of the trade wind than upon any other part of them.

“The TIDES about these islands are perhaps as inconsiderable as in any part of the world. A South or S. by W. moon makes high water in the Bay of Matavai in Otaheite; but the water very seldom rises perpendicularly above 10 or 12 inches.*

“The variation of the compass was found to be 4° 46' easterly, from the average of a great number of observations, but which differed very considerably from each other (1769).”†

A few words may be said as to the names of the islands. The first appellations, La Sagittaria by Quiros, King George Island, by Wallis, Nouvelle Cythère by Bougainville, or Amat of Bonecheo, have all been abandoned for the native name, as is most proper it should be in all cases. Capt. Cook was the first to give it its correct appellation, *Otaheite*, as he spells it. We have here an excellent example of the want of some uniform standard. This orthography was followed by the first missionaries because it had been too long in use to be altered. “Thus Otaheite is to be pronounced so as to rhyme with the adjective *mighty*.” In the subsequent proceedings, in reducing the native oral to a written language, an important change was found necessary, and in this the consonants were used as in French and German, and the vowels as in Italian, a system now employed in almost all Asiatic orthography. Thus the new form of the word is O Tabiti, or generally without the prefixed article. The Spaniards have spelt it Tagiti; the French, Tabeite, Taiti; every variety of form having been used. But as the printed language has in great degree become the standard, *Tahiti*, as is there used, has been here preferred, and is well known.‡

Of the name by which the group is distinguished it may be observed that the term Society Islands was given by Cook to those lying to the N.W. of Tahiti, the greater number of which were discovered by him; but he did not include in

* It has been repeatedly stated by different navigators, that these observations led to the conclusion that the tidal phenomena accorded with the generally received law. By others, and more particularly by Capt. Kotzebue and Capt. Beechey, it has been advanced that there was but one tide in the twenty-four hours, it being high water about noon. Mr. Williams, the missionary, denies this, and states that they are perfectly regular; and the observations carefully conducted by Capt. Sir Edward Belcher in H.M.S. *Sulphur*, in 1840, negative the theory of a noon high water. See *Missionary Enterprise*, pp. 202-3.

† Hawkesworth's Collection, vol. ii. pp. 247-8.

‡ See *Missionary Voyage of the Duff*, p. 5; and Ellis's *Polynesian Researches*, vol. i. pp. 77-8.

this the principal of the group, which is naturally connected with the rest. The younger Forster first proposed the extension of the name to those comprehended by Bougainville in his *Archipel de Bourbon*. In this all modern geographers have agreed, therefore the original division of the group into King George Island and the Society Islands has become obsolete.

MAITEA or OSNABURGH ISLAND is the easternmost of the group. It was discovered by Wallis in the *Dolphin*, in 1767, and he gave it the second of the above names; though there seems to be but little doubt but that it is the same called by Quiros *Dezena*, because it was the tenth discovery made in his voyage. Bougainville saw it in 1768, and called it *Le Boudoir*, or *Pic de la Boudense*; and Bonecheo, previously mentioned, called it *San Cristobal*. The native name is to be preferred to all these. It is high and round, and not more than 7 miles in its greatest extent. Its North side is remarkably steep. The South side, where the declivity from the hills is more gradual, is, or was, the chief place of residence of the natives; but the North side, from the very summit down to the sea, is so steep, that it can afford no support to the inhabitants. The eastern part is very pleasant, cocoa-nut and other trees abounding. Near the East end are two remarkable rocks, and a reef runs off to the eastward about half a league.

Its greatest elevation is 1,597 feet, and it is in lat. $17^{\circ} 53'$, lon. $148^{\circ} 5'$.*

TAHITI is about 32 miles long from N.W. to S.E., and is an elongated range of high land, which, being interrupted in one part, forms an isthmus about 3 miles in breadth, which connects the two peninsulas. From a low margin of sea-coast the land rises to a very considerable height on both extremities of the island, while some highly fertile plains or valleys intersect the ranges in different parts. The loftiest mountain, which is in the northern peninsula, was estimated by Capt. Beechey to be about 7,000 feet in height. According to the measurements of the United States' Exploring Expedition, Aorai, the peak which is next in height to Orohena, is 6,979 feet high, and Orohena appeared to be about 1,500 feet higher. So that the highest point may be taken at 8,500 feet above the sea. From these two peaks ridges diverge to all parts of the coast; they are precipitous, and generally narrow, in places a mere edge.†

Of late years the lower lands of Tahiti have undergone considerable change by the introduction of the guava shrub, brought from Norfolk Island thirty-five years since. This has flourished in an extraordinary manner, and has now usurped the soil to a very great extent. For miles the woodlands and bush are composed almost entirely of this shrub, which bears a profusion of large and delicious fruit.

The island is nearly or quite surrounded by an excellent broad road, called the Broom Road, which, overshadowed with trees, affords a delightful means of visiting the different settlements distributed around it. In the code of laws adopted by Pomare, the punishment for getting intoxicated was making so many feet of this road. Intoxicating liquors are still prohibited by the French regulations.

Outside the low belt of land at the foot of the mountains, a coral reef encircles

* Dalrymp'e's Collection, vol. i. p. 42; Bligh, *Voyage of the Bounty*, p. 58; Hawkesworth's Collection, vol. ii. p. 240; Beechey, *Voyage of the Blossom*, vol. ii. p. 676.

† Narrative of the United States' Exploring Expedition, vol. ii. p. 56.

the island at the distance of 2 or 3 miles, and within this rocky bank are several excellent harbours, where the sea is constantly tranquil, but the best and only one used is Matavai Bay, on the North side.

All voyagers unite in praise of the beautiful appearance of Tahiti. It is sufficiently high to be seen at 15 leagues' distance, when, if to the East or West, it appears like two islands, the low connecting isthmus not being seen.

Capt. FitzRoy says :—" November 15th, 1835. Early this morning we saw Otaheite, but clouds hanging over the high land, and a haziness about the horizon, at first disappointed our expectations. As the sun rose higher, the clouds shrunk away, vanishing as they rolled along the grandly formed mountains; high, sharp, irregular peaks and huge masses of rock appeared between the mists, and again were hidden in deep valleys or glens, showed darkly, and, while the shadows passed, seemed to be denied the light of day. Strikingly different in appearance were the lower hills and dales, and the richly-wooded land at the sea-side. There the bright sunshine heightened the vivid and ever-varying tints of a rich verdure. The beautiful alternation of light and shade, each moment changing as the flitting shadows passed over every kind of green; the groves of graceful palm trees; the dazzling white foam of the breakers on the coral reefs, contrasted by the deep blue of the sea, combined to form a most enchanting view. At a distance in the West, Eimeo showed a picturesque outline, and added to the beauty of a scene which surpassed our ideas, even heightened, as they had been, by the descriptions of former navigators." *

Tahiti consists, then, of two peninsulas, which the natives distinguish by the names of *Opoureonu* (Cook), or Tahiti-Nui (Great Tahiti), and *Tiarraboo* or Tahiti-Iti (Little Tahiti). On the North side of the former is the chief place of the group.

POINT VENUS, the northern point of Tahiti, is the most important geographical site in the Pacific Ocean, as it has been the point most accurately determined, or at least has had more extensive series of observations made on it than elsewhere. Cook's first expedition led to this spot to observe the transit of Venus, in 1769, as previously stated, and here the great navigator and Mr. Green, the astronomer, observed that occurrence. From these observations Mr. Wales deduces its position as lon. $149^{\circ} 26' 15''$ W. From the observations made during his second voyage, Mr. Bayley deduces it as lon. $149^{\circ} 28' 23''$ W., nearly identical with what Capt. Beechey made it in 1826.

In the first chronometrical chain of distances carried round the world, which was done by Capt. FitzRoy, in H.M.S. *Beagle*, in measuring eastward it was $149^{\circ} 26' 14''$, and westward $149^{\circ} 34' 30''$. Thus the entire circumference was made to be $8' 16''$ in excess, and taking Tahiti as the point where this correction would be best made, the mean would be $149^{\circ} 30' 22''$.

Lieutenant Raper assumes Point Venus flagstaff to be in lat. $17^{\circ} 29' 15''$ S., lon. $149^{\circ} 29' 0''$ W., as a *secondary meridian*. Therefore, should this point be measured, whatever the longitude it is considered to be in should be stated, as well as the difference of longitude between it and the position ascertained.

* Narrative of the Voyage of the *Adventure* and *Beagle*, vol. ii. pp. 508-9.

MATAVAI BAY lies to the westward of Point Venus, and was called *Port Royal Harbour* by its discoverer, Wallis, in 1767, but this has been superseded by its native name. To the S.W. of the point is a coral bank, which is separated from it by a very narrow channel; and it was upon this bank, which has only 13 feet on it in places, that Wallis's ship struck as he entered the bay, hence it is called the *Dolphin Bank*. The S.W. limit of the bay is at the *West Bluff*, surmounted by *One Tree Hill*, about a mile from Point Venus. There are some detached spots off the West Bluff, and to the northward of the Dolphin Bank, with 18 and 20 feet water on them. One is called the *Banana Reef*, another the *Pooroo Reef*, by Capt. Beechey.

PAPAWA HARBOUR commences about a mile W.S.W. of the West Bluff, and is formed to seaward by the usual line of shore reef, just level with the water. Outside this the water becomes unfathomable immediately. The village of Papawa lines the shore of the harbour, which is about a mile in length, East and West.

TOANO HARBOUR adjoins it on the West, and its entrance is formed by an opening between the outer reef. Capt. Beechey surveyed it in 1826, and has given directions for it, recited beneath. There would appear to be an increase of depth here since that survey, either from volcanic action or from the wearing away of the coral banks, for Capt. Sir Edward Belcher states that in 1840 ships might ride on the spot where the consul's house stood in 1826. At the latter period the channel which leads to Papiete from it was considered impracticable, but in 1836 the French frigate *L'Artemise*, under Capt. Laplace, entered by it, and it has since become the common entrance to Papiete.*

The ensuing directions for these harbours on the North side of Tahiti are given by Capt. Beechey, in the *Voyage of the Blossom*:—

In clear weather the mountains of Otaheite may be seen 90 miles from the deck. The ports most frequented are situated on the North side of the island, and may be approached without difficulty when the trade wind is blowing. It, however, sometimes happens in the winter months that the trade wind is interrupted by breezes from the N.W. and West, and at others that calms and unsettled weather prevail. At such times avoid getting into the bay between Otaheite and Tiarraboo, especially on the S.W. side of the island, as the swell rolls in heavily upon the shore, and there is no anchorage outside the reefs.

Arrived within a few miles of the north-eastern part of Otaheite, several points covered with cocoa-nut trees will be seen stretching from the foot of the hills. One of these is Point Venus, and may be known by *One Tree Hill*, which, with the exception of the western extremity of the island, is the last bluff headland upon this part of the coast.

Matavai Bay, on the south-western side of Point Venus, may be considered a safe anchorage from April to December; but during the remainder of the year the trade is liable to interruptions from westerly winds, which blow directly into Matavai, and occasion a high sea. The protection to the anchorage is afforded by Point Venus and the Dolphin Shoal, a coral bank, with only $2\frac{1}{2}$ fathoms upon

* *Voyage of the Sulphur*, vol. ii. p. 12.

its shallowest part. Between it and Point Venus there is a channel about 50 yards wide, with 17, 15, and 10 fathoms close to the reef; and by anchoring a boat on the edge of the shoal, a vessel may enter with perfect safety, provided the breeze be fair. It is, however, better to pass to the southward of the bank, which may be ascertained by two remarkable cocoa-nut trees on the E.N.E. being seen, to the southward of an European built house on the beach, bearing E. by N., and haul round it towards the anchorage, taking care not to get to leeward, so as to bring the N.E. bluff of One Tree Hill to bear to the southward of S.E., as there are several coral banks in that direction. Anchor in $8\frac{1}{2}$ or 9 fathoms, mud, off old Pomarre's house, taking care of the reef that lies off that part of the shore.

To the westward of Matavai there are three good harbours, Papawa, Toanoa, and Papiete, of which the latter is the largest and most frequented. The others, however, are the most healthy. The entrances to all are extremely narrow, and a stranger ought to take a pilot on board; but he should bear in mind that some of the persons who act in that capacity, though well acquainted with the channels, understand very little about navigating a vessel.

Toanoa is 4 miles West of Matavai, and may be known by a remarkable ragged mountain, which will be seen through a deep valley when abreast of it. When near, this ragged mountain is very conspicuous, and at night is a good guide to the entrance.

The channel into Toanoa is only 330 yards wide; off the eastern side of the passage there is a rock, upon which the sea sometimes breaks, lying N.W. 60 fathoms from the breakers, and another on the *inner* side of the opposite reef. Neither of these rocks, however, narrow the channel much, and are only dangerous in the event of the wind breaking the ship off, or in rounding the reefs closely. With a fine wind sail boldly in, keeping mid-channel, and, clewing all up, allow the ship to shoot into a berth about 2 cables' length from the shore, in 13 or 14 fathoms. Here she must await until the wind falls, and then tow into the harbour; or if the wind be off the land, set fore and aft sails, and keep the boats ready with lines in them. There are three channels to the inner harbour, of which the two South ones only are frequented, on account of the currents running strong through that to the northward. Perhaps the centre channel, though scarcely broader than a frigate, had better be used going in, and the South coming out. In the centre channel there are 8 to 12 fathoms water; but in the southern one a shoal extends from the shore, which renders it necessary to keep close to the rock. Anchor in $8\frac{1}{2}$ fathoms, about midway between the outer reef and the shore, opposite some cottages; and moor head and stern by fastening cables to the trees on shore, and carrying out the small bower close to the outer reef. To proceed to sea, it is necessary to warp into the outer anchorage, after the sea-breeze has done in the evening, or very early in the morning before it sets in, and push through the channel before the current makes strong. In all these entrances the current sets out in the daytime, sometimes at the rate of 2 or 3 knots, and rather sweeps over the reef to the leeward. There is another entrance to Toanoa from Papiete, but that just described is the most convenient.

The Harbour of Papawa is not frequented, and as it cannot be entered without a pilot, I shall give no directions for it.

PAPIETE.—Two miles to the westward of Toanoa there is a harbour, called by the natives Papiete, capable of containing at least thirty vessels. The entrance is even narrower than that at Toanoa, being only 320 feet in the clear, and has a bar with only $4\frac{1}{2}$ fathoms on it. The current here sets out faster than through the channel to the northward, and in blowing weather the sea breaks quite across. This is also a more intricate and dangerous channel than the other; and the only way for a stranger to ensure safety is to moor a boat in the middle of the channel. There are no good marks for this spot; but as a general remark keep about 40 yards from the western extremity of two rocks which lie 80 yards off the dry part of the eastern reef. These two rocks have only $1\frac{1}{2}$ fathoms upon them, and generally break. There is another rock about 60 yards North of the eastern reef; but this lies out of the channel. On the western side of the channel there is a shoal, with only $1\frac{1}{2}$ fathoms of water upon it, which extends midway between the dry reefs. From this description it is evident that a pilot is necessary for this port, and that the boats should be in readiness to tow or run out kedges as required, whether the pilot advises it or not.

After the entrance is passed, steer S. by E., *true*, until the first rock on the inside, bearing S.E. by S., one-eighth of a mile from the eastern dry reef, is passed; then haul towards the missionary church, and beat up to the anchorage between that shore, which may be approached within half a cable's length, and the reefs which extend from the Moto, or low island, towards the S.W. These reefs will be seen, and may be approached as close as convenient. Another rock lies S. by W., *true*, 2,000 feet from the entrance; but with the trade wind this will be weathered.

If it be necessary, the Moto may be passed to the eastward; but the channel is very narrow, and can only be safely navigated by a person acquainted with it.

Papiete is a very convenient harbour in many respects, but it is subject to calms and much hot weather, in consequence of its being rather to leeward, and the trade wind being obstructed by woods of cocoa-nut trees.

The tides in all these harbours are very irregular. It is generally high water at half an hour after noon every day, and low water at six in the morning.* But respecting the tides, see some preceding remarks on p. 881.

Papiete, the seat of government of the Tahitian Islands, stands at the foot of Orohena, the highest mountain of the island. The ground here is level, but there is not much space between it and the foot of the mountains. It is covered with the richest and most beautiful vegetation. Papiete is not a town, nor a village, nor yet a hamlet. The Spanish word *pueblo* perhaps best expresses its character. It is a collection of small houses, spread without order in the midst of orange trees, cocoa-nuts, and guavas, which embellish the shore, that extends in a semicircle around the road. The aspect in general has nothing imposing, but it is extremely pleasant and picturesque. The background is filled up with a number of pinnacled mountains, jutting in a great variety of forms.

At the back of Papiete is the village of *Amelie*, a single street of houses or cottages in the European style, built of coral blocks, and so constructed as to be

* Voyage of the *Blossom*, vol. ii., Appendix, pp. 646–648.

capable of being defended. They are (or were) occupied by the government artificers. Here, too, many of the French soldiers live in small huts, around which, as is the case with the rest of the place, are nice gardens, producing abundantly. On the height over the village is the block-house, a wooden building, one of six which protect the town.

The remainder of the Island of Tahiti has never been very accurately or recently examined, so that, for nautical purposes, little can be gleaned from the various accounts of the island.

The greater part of the N.W. side of the larger peninsula is protected from approach by the encircling coral reef, which need not be dilated on, as there does not appear to be any very accurate description of it.

Mr. Bennett, in his whaling voyage, went around the island :—" On the S.W. side of the island I noticed the numerous caverns which penetrate the base of the precipitous cliffs that form this portion of the coast. One of these caverns which we inspected was situated at the base of a mural cliff, of about 200 feet high, and its face clothed with ferns and other elegant verdure. The mouth of the cavern formed a large arch ; the bottom was occupied by a sheet of fresh water, produced by infiltration through the rock. I also noticed here a number of springs of fresh water, that rise from the midst of the sea, at greater or less distances from the shore. Their situation is marked by small eddies or whirls on the smooth surface of the sea over the coral reef ; and upon some of these the natives have placed bamboos, with apertures in their sides, through which the fresh water flows as from a pump. When fishing on the coast in their canoes, it is not unusual for the natives to dive beneath the surface of the sea, and quench their thirst at these fresh-water springs. The cause of their existence is of course simple, although the effect is somewhat extraordinary."

The great morais of Papawa, at the S.W. part of the larger peninsula, described by Sir Joseph Banks at the time of Cook's first voyage, was then nearly perfect. It is an enormous pile of stone work, of a pyramidal form, on a rectangular base, 270 feet long and 94 feet wide ; the ten steps by which it rises are 6 and 5 feet in height. The labour required to collect this mass of stones and coral blocks must have been enormous. Since Cook's visit it is much dilapidated, and is now about 40 feet high, and the sides nearly obliterated. It has been taken by conquest, and thus left to decay since the earlier visits of Europeans.

The coral reef is interrupted in front of the small bay which makes up to Papawa, and the surf dashes with some violence against the shore ; with this exception the passage may be made within the reef in smooth water. From this part the South coast assumes a more easterly direction to the low isthmus, which was probably alluded to by Quiros, the first discoverer.

The ISTHMUS which connects the two peninsulas is apparently covered with trees quite across, and on both sides the land seems to be better fitted for cultivation than any other part of Tahiti. On the Tiarraboo side it is covered with fern, with scattered clumps of trees ; the land level at top, but broken, or rent as it were, into chasms or deep hollows, and rising with a gradual ascent towards the lofty mountains which form the middle and eastern divisions of Tiarraboo. At

the South side of the isthmus a cove, about 60 yards wide, and of sufficient depth to admit a ship, runs close up to the low neck ; it would be an excellent place for a ship to moor in if a passage could be found between the large coral patches which lie without it.*

TIARRABOO is the name of the lesser Peninsula of Tabiti. It is of much less importance at present than the northern portion. As it is not improbable but that ere long the French may give to the world some details which will be more ample, and of a different character to that at present attainable, little will be said here of its minor features.

Capt. Cook says :—" Perhaps there is scarcely a spot in the universe that affords a more luxuriant prospect than the S.E. part of Otaheite. The hills are high and steep, and, in many places, craggy ; but they are covered to the very summits with trees and shrubs, in such a manner that the spectator can scarcely help thinking that the very rocks possess the property of producing and supporting their verdant clothing. The flat land which bounds those hills toward the sea, and the interjacent valleys also, teem with various productions that grow with the most exuberant vigour, and at once fill the mind of the beholder with the idea that no place upon earth can out-do this in the strength and beauty of vegetation. Nature has been no less liberal in distributing rivulets, which are found in every valley, and, as they approach the sea, often divide into two or three branches, fertilizing the flat lands through which they run. The habitations of the natives are scattered without order upon these flats ; and many of them, appearing towards the shore, presented a delightful scene, viewed from our ships ; especially as the sea within the reef which bounds the coast is perfectly still, and affords a safe navigation, at all times, for the inhabitants, who are often seen paddling in their canoes indolently along, in passing from place to place, or in going to fish. On viewing these charming scenes, I have often regretted my inability to transmit to those who have had no opportunity of seeing them such a description as might in some measure convey an impression similar to what must be felt by every one who has been fortunate enough to be on the spot."†

All the eastern part of Tiarraboo consists of high rugged mountains, which run to the sea-side, and form steep cliffs, which are extremely dangerous to pass by land ; on this account the low land is narrow, and distributed partially ; the coral reef fronts the whole of the eastern portion of the land, and on it, towards the South part, are some small islands.

Aguila or *Langara's Harbour*, or *Owhaiouroa*, lies to the northward of one of these islands, and was so named, in 1772, by the Spanish navigator alluded to in the introductory remarks. In August, 1773, Cook's ships, the *Resolution* and *Endeanour*, narrowly escaped shipwreck here.

Ocatipeha Bay is on the North side of Tiarraboo, and was visited by Cook, both in his second and third voyages. In the interval between these the Spanish commander, Don D. Bonecheo, had come hither and had died. He was buried at the foot of a cross they had erected here, as was mentioned in the prefatory remarks.

Bougainville's Harbour is on the eastern side of the larger peninsula. That

* Voyage of the *Duff*, p. 196.

† Cook's Third Voyage, vol. II. p. 144.

navigator came here, and lost both his anchors and cables. Its entrance is through the encircling reef to the southward of an island lying within it. A second island is marked to the northward of this, and the reef continues hence at a considerable distance off the shore as far as Point Venus. It was on a portion of this that the French frigate *L'Artemise* struck in 1836.

The N.E. reef extends from $1\frac{1}{2}$ miles E. by N. $\frac{1}{2}$ W. of Point Venus to the valley of Hapaino. It is about 10 miles distant from Point Venus, and the first valley to the eastward of it. This reef is detached, and for the most part lies parallel to the coast, except near its centre, when it then trends to the N.N.E. for about a quarter of a mile. The channel between this reef and the reef to the southward is abreast of this valley (Hapaino), and about 2 miles in width. The soundings on this reef are very regular; from the shoal part near its centre the depths gradually increase from 3 to 12 fathoms, coral rocks; it has on one part for a considerable distance from 3 to $4\frac{1}{2}$ fathoms; and this tract may be known by its lying directly off a remarkable part of the land, which is a little declining, but nearly table land. Towards the eastern end it trends for a short distance S.S.E., and then terminates to S.W.; the outer part of this reef is from $2\frac{1}{2}$ to 3 miles off shore. Marks, when on its centre:—Point Venus will just be on with the highest peak in the Island of Eimeo, bearing W. by S. $\frac{1}{2}$ S. To avoid it, a ship coming from the eastward, when within 10 miles of Point Venus, ought not to bring that point to bear more westerly than W.S.W. Between the reef and shore the passage is good, but, leading to neither harbour nor place of shelter, can be of no advantage, and ought therefore to be avoided. This reef seldom, if ever, breaks, and is from one-quarter to three-quarters of a mile in width; least water, 3 fathoms.

This reef and the following have not been laid down in any chart. They exist in the only spot off the N.E. part of the island where Capt. Cook has not laid down any, and therefore very liable to mislead a stranger.

The eastern reef off Tahiti lies off the valley of Teallay, and is more dangerous than the former, from its being hid from Point Venus. Most vessels making that part of the coast invariably stand in-shore; to make that point (which is low, and covered with cocoa-nut trees) would, by keeping too close in, in all probability get within this reef, as it does not break. The outer part is from $2\frac{1}{2}$ to 3 miles off shore. The depths are regular, from 4 to 8, 10 and 12 fathoms, sailing over it in a direction parallel to the shore. The bottom is all coral rocks; it is from three-quarters of a mile to a mile wide, and lies parallel to the shore. Marks from the depth of 3 fathoms, least water found on it, are the high peak, and near the centre of the peninsula of Tiarraboo, on with the low and extreme point of the largest peninsula, bearing S.S.E. $\frac{1}{2}$ E. This point has two small islands lying off it, and a very remarkable black mould-hill near the village, close to the beach, and nearly perpendicular, bearing S.W. by W. $\frac{1}{2}$ W. A ship may enter within this reef, as there is deep water at either end. It is about 5 miles in length, and very detached.*

* Mr. W. Forbes, H.M.S. *Hyacinth*, Papeete, Tahiti, May 10th, 1835; *Nautical Magazine*, May, 1836, pp. 264-5.

This completes the circuit of Tahiti. This imperfection of the description of all the southern and eastern parts is of the less importance, as they are, in a commercial view, but of very slight interest.

TETUROA, or *Tethuroa*, is a small, low island, or rather group of small low islets, about 6 miles in length, enclosed in a reef about 10 leagues in circuit, and lying, according to Capt. Cook, at 8 leagues N. $\frac{1}{2}$ W. from Point Venus. The reef is inaccessible to large canoes. The islets abound in cocoa-nuts, which flourish most in the lowest places; in this, perhaps, they differ in their qualities from those of Tahiti. The former rulers of Tahiti would not allow the bread-fruit to be planted here, so that those who lived on it should be obliged to bring the fish which abounds around it to exchange for that article. It is plainly seen from the high ridges of Tahiti, and in former times was the watering place of Tahiti, being frequented by the licentious Areois, especially the women and the effeminate class, for recovery of their bodily diseases, occasioned by their debauchery, and to increase the delicacy of their complexions. Its S.E. point is in lat. $17^{\circ} 2' S.$, lon. $149^{\circ} 47' W.$

Bougainville called it *Oumaitia*. Burney considers it to be the same island as the *Fugitiva* of Quiros. This opinion, which varies from that of Fleurieu and Espinosa, is also followed by Admiral Krusenstern.*

EIMEO ISLAND was discovered by Capt. Wallis, July 27th, 1767, and by him named *Duke of York Island*. By Vancouver it is called *Morea*, and he has been followed by many others; but, according to Dr. Forster,† *Morea* is only a district of Eimeo, but is frequently applied to the whole island by the natives.

The distance between the reefs of Tahiti and that of Eimeo, as was measured by Capt. Wilkes, in the United States' Exploring Expedition ship *Vincennes*, with the patent log, was 10 miles. Eimeo is a beautiful object in the view from Tahiti, and its beauty is enhanced on a nearer approach; its hills and mountains may, without any great stretch of imagination, be converted into battlements, spires and towers rising one above the other; their gray sides clothed here and there with verdure, which, at a distance, resembles ivy of the richest hue.

Eimeo has, if possible, a more broken surface than Tahiti, and is more thrown up into separate peaks; its scenery is wild even in comparison with that of Tahiti, and particularly upon the shores, where the mountains rise precipitously from the water to the height of 2,500 feet. The reef which surrounds the island is similar to that of Tahiti, and has no soundings immediately outside of it. Black cellular lava abounds, and holes are found in its shattered ridges, among which is the noted one through which the god Oroo is said to have thrown his spear.

The inhabitants of Eimeo reside upon the shores, and there are several large villages on the southern side of the island. Coffee, cotton, sugar, and all other tropical plants, succeed well at Eimeo, and sugar is made to a considerable extent.‡

TALU HARBOUR lies on the North side of Eimeo. It is a romantic glen,

* *Mémoires Hydrographiques*, vol. i. p. 242.

† *Observations*, p. 217.

‡ *Narrative of the United States' Exploring Expedition*, vol. ii. pp. 57—69.

penetrating the island for 2 or 3 miles in a southerly direction, enclosed by precipitous sides, rising in some places to the height of 2,000 feet ; at its head is an extensive flat of rich alluvial soil, employed in the culture of sugar, and studded with trees, shrubs, and other interesting objects. Capt. Cook, in his third visit, was the first to find this singular and excellent harbour. "For security and goodness of its bottom it is not inferior to any harbour that I have met with at any of the islands in this ocean ; and it has this advantage over most of them, that a ship can sail in and out with the reigning trade wind, so that access and recess are equally easy. There are several rivulets that fall into it. The one at the head is so considerable as to admit boats to go a quarter of a mile up, where we found the water perfectly fresh. Its banks are covered with the *pooroo* tree, as it is called by the natives, which makes good firing, and which they set no value on, so that wood and water are to be got here with great facility."

The entrance to the harbour is between two reefs ; the only danger not above water lies on the port-hand going in. The land wind blows out generally strong.

PARAU-ROA HARBOUR.—"On the same side of the island, and about 2 miles to the eastward, is Parau-roa or Parowroah, much larger within than that of Talu ; but the entrance or opening in the reef (for the whole island is surrounded by a reef of coral rock) is considerably narrower, and lies to the leeward of the harbour. These two defects are so striking that the Harbour of Talu must always have the preference. It is a little extraordinary that I should have been three times at Otaheite before, and have once sent a boat to Eimeo, and yet not know till now that there was a harbour in it. On the contrary, I always understood that there was not. Whereas there are not only the two above mentioned, but one or two more on the South side of the island. But these last are not so considerable as the two just described." Capt. Wilkes calls it *Papoa*, or *Cook's Harbour*, and says there is a marked resemblance between it and Talu. Wood and water may be had at both harbours in abundance, but in other respects the island is not well adapted for the supply of ships. Not more than a single ship would probably be able to find refreshments at a time. It is therefore seldom visited, and its surplus produce is carried to Tahiti for sale. Notwithstanding, the articles of traffic are quite as dear as Tahiti.* These last remarks may be perhaps modified since the reign of the French protectorate.

From the dissensions and internal disorder incident to the protectorate wars, provisions and supplies have become scarce and dear of late years, more particularly at Tahiti, Eimeo, and Huaheine. At Bora-Bora they are cheaper. The principal articles of stock to be procured are pigs, poultry, and bread-fruit ; there is but a small quantity of taro.—(Capt. Worth, H.M.S. *Calypso*, 1848.)

The perforated peak before alluded to, which is 4,041 feet high, is in lat. 17° 30' S., lon. 149° 47' W.

TAPAMANOA, MAUITI, or SIR CHARLES SAUNDERS'S ISLAND, was discovered July 28, 1767, by Capt. Wallis.† Its greatest length, from East to West, is about 6 miles. In the centre a mountain with a double peak rises, but the

* Cook's Third Voyage, vol. ii. pp. 79, 80, 89 ; Narrative of the United States' Exploring Expedition, vol. ii. p. 58 ; Capt. Bethune, R.N., &c.

† Hawkesworth's Collection, vol. i. p. 401.

greater part has a fertile appearance, and the lower ground abounded with coconut trees. The habitations seemed to be small, and not very numerous. The island was formerly celebrated for its yams, and in 1836 was used as a penal settlement. It is also called *Tapooa-manoo*, and *Tabuai-manú*. The hills are wooded to their summits, and at a distance the island has much the appearance of a ship under sail. The peak is in lat. $17^{\circ} 29'$, lon. $150^{\circ} 44' W$.

HUAHEINE (*Vahine*, woman) is the easternmost of the group which was called the Society Islands by Cook. He discovered it in July, 1769. It is about 20 miles in circumference, and is divided into two peninsulas, *Huaheine-Nui*, or large, and *Huaheine-Iti*, or small. The isthmus connecting these two portions is overflowed at high water, forming a boat passage. In other parts of the island there are also salt lakes near the sea. It has a very narrow strip of fertile land near the shore; and the hills, which are not near so high as those of Tahiti, more strongly indicate volcanic action, and are in some parts entirely cultivated. The productions are similar to those of Tahiti, but come to perfection earlier. Mr. Benuett noticed the venerable shaddock tree planted by Cook in 1777. Coffee thrives in the missionaries' gardens. The population, in 1828, was estimated at 2,000.

Owharre Harbour, which was always visited by Cook on quitting Tahiti, is situate at the N.W. end of the island. Run round the North end of the island, which is clear, and you are off one entrance. Shoot up as far as you can if the wind is scant, anchor and warp in. There is another entrance more to the southward, marked by a small wooded kay. The name of the settlement is *Fari*. It was here that Cook, in his last visit, left Omai, the Tahitian native, who had attracted so much attention in England. *Owharre Harbour* lies, according to Cook, in lat. $16^{\circ} 43'$, lon. $151^{\circ} 7' W$.

RAIATEA, or ULITEA, lies 7 leagues to the westward of Huaheine. Prior to Capt. Wallis's visit in 1767, it was the principal island of the group, and in strict alliance with Otata, the adjoining island, and also with Huaheine, but the secession of Otaha led to its decline. Mr. Bennett describes it as follows:—"Raiatea is situate about 130 miles to the N.W. of Tahiti, this being the bearing in which the islands of the Polynesian groups usually lie, a direction that volcanic action appears very generally to follow. It is about 40 miles in circumference; of mountainous character, covered with vegetation, and but too well watered, cascades, rivers, and swamps abounding in all directions. At the distance of $1\frac{1}{2}$ or 2 miles from the shore the land is encircled by a coral reef, that also includes the adjacent Island of Taha. Here are seven excellent anchorages on the weather and lee sides of the island, accessible at times and egress easy, except with a due South wind. Raiatea has no commerce worthy of notice; cocoa-nut oil and arrow-root are occasionally procured by small vessels from New South Wales or South America; attempts have been made to produce tobacco, and to make ship's cordage from the bark of the hibiscus, for the Sydney market, and biche-de-mar, with which the reefs abound, for that of China; but although the island is capable of all these and many additional exports, opposing circumstances have caused every effort to establish a permanent commerce to be speedily relinquished.

"The soil is exceedingly fertile, exotic fruit trees thrive vigorously; and particularly the fruit of the lime proves invaluable to foreign shipping, and affords a striking example of the important advantages that accrue from the dissemination of useful fruits and vegetables. The population appeared to me to have suffered dreadfully from disease. Accompanied by some natives, I ascended a lofty range of mountains occupying the centre of the island, extending nearly in a North and South direction, and about 2,000 feet in elevation. The summit presented a level and spacious plain of dark and bleak aspect, spread with numerous swamps and streams of water, passing over exposed rocks of a red colour, and entirely destitute of other vegetation than short grass and moss, although but a few feet beneath, on the less exposed spots, vegetation was lofty and abundant. On the eastern declivity of the mountain, a short distance below its summit, I was shown by my guides a natural excavation, about 40 feet deep, resembling a large well, about 36 feet in circumference, the character of which led me to consider it as a small volcanic crater, yet few of these have hitherto been ascertained to exist in the Society Islands. It is remarkable that a stream of water, flowing over the declivity of this elevated mountain, abounds with eels and other fish, several varieties of which I saw sporting in the water."

The surrounding coral reef has several islets on it, and the space between it and the island offers several excellent anchorages, as before stated.

Uturoa Harbour is one of the best of them, and is on the East side. It is a reef harbour, and has two or three entrances. *H.M.S. Conway* went in at the most northerly. From *Huaheine* steer across for a bluff that forms the northern extreme of *Raiatea*, and you will fall upon two islets, between which is the passage. If bound to leeward, it is usual to run out through a passage to leeward of the island, keeping round inside the reefs; to do this you must be able to lay up South on the larboard tack. The King's Wharf* in *Uturoa* is in lat. $16^{\circ} 50' S.$, lon. $151^{\circ} 24' W.$ Capt. Worth, R.N., says the best anchorage amongst the islands is at *Raiatea*, as there is a good entrance and equally as good an exit, and which are always capable of being taken, the wind always blowing directly through. The only disadvantage is the depth of water, about 18 to 24 fathoms. The holding ground is, however, very good, with abundance of fresh meat, vegetables, and fish to be obtained. Fresh water can also be procured here, but not so readily as at *Tahiti*.

Ohamaneno Harbour is on the N.W. side of *Raiatea*. The entrance is between two sand islands, and is about a quarter of a mile broad. The numerous astronomic observations made by Capts. Cook and King here in 1777 place this bay in lat. $16^{\circ} 45' 32''$, lon. $151^{\circ} 36' 22'' W.$

TAHAA, or *OTAHAA*, lies to the northward of *Raiatea*, but is separated only by a channel of not more than 2 miles in width. They are both surrounded by the same reef; and the space between them enclosed by the reef forms a beautiful sound, which merits examination. *Tahaa* is about half the size of *Raiatea*, and is not so fertile. Capt. Cook visited it in 1769 in his boats, and Lieut. Pickersgill was sent around it by him in a boat in 1773. It is surrounded on all sides by a

* Capt. Drinkwater Bethune, *Naut. Mag.*, Oct., 1840, p. 684.

number of small islands, and all the passages between them are encumbered with coral reefs. But there are several commodious harbours within, as *Ohamene Harbour*, on the S.E. side, and *Oherurua Harbour*, on the western side. The proximity of those on Raiatea, however, render them unimportant. The centre of Tahaa is in lat. $16^{\circ} 35' S.$, lon. $151^{\circ} 35' W.$

BOLA-BOLA, or BORA-BORA, is $4\frac{1}{2}$ leagues N.W. of Tahaa, to which it is inferior in extent, but the reef with which it is surrounded is nearly full of islets, much larger than those which are scattered among the rocks that enclose Raiatea and Tahaa. It differs from those islands, and from Huabeine, in having but one harbour on its coast; whereas the shores of the others, being strongly indented, form, like the coasts of Eimeo, numerous places of shelter for shipping. It is also distinguished by a very lofty, double-peaked mountain in its centre, and is more rude and craggy than the rest of the Society Islands. Its eastern side has a barren appearance; the western is more fertile; a low border which surrounds the whole, together with the islands on the reef, are productive and populous. Its earliest inhabitants are said to have been malefactors, banished from the neighbouring islands. Capt. Cook did not land here upon his first or second voyage, and in 1777 he was prevented from anchoring in the harbour, which is very spacious, by contrary winds.

Otea-vanua Harbour is on the West side; it is well sheltered, and, as before stated, very spacious; the depth is 25 fathoms, on good holding ground; but the entrance has the disadvantage of a rocky bottom. Capt. Worth, of H.M.S. *Calypso*, says:—"The anchorage at Bora-Bora is difficult, as you are obliged to shorten sail between the points forming the entrance, and shoot up as far as the ship's way will allow, and then anchor, the wind always blowing directly out; it is then necessary to kedge up to the head of the harbour, where you may generally be able to make sail to the anchorage off the settlement.

"Here, as in all the harbours of the Society Islands, it is advisable to enter before noon, as the water appears to be still, and at times setting in until noon, when it recedes, the strength of the current being determined by the body of water thrown inside the reefs, and which depends upon the strength of the wind, and the break over the reefs caused by it.

"The reefs which surround these islands are all steep, and do not extend farther than $1\frac{1}{2}$ miles except at Bora-Bora, where the reef stretches to the S.E. nearly $3\frac{1}{2}$ miles, making a very dangerous spit, particularly coming from Raiatea, as it is in the route to the harbour of Bora-Bora."

The position of the settlement at Otea-vanua is in lat. $16^{\circ} 31' 35'' S.$, lon. $151^{\circ} 46' 0'' W.$

MARUA, or MAUPITI, or, according to Capt. Bethune, *Manite*, is the westernmost of the group. It is a small and comparatively elevated island, about 6 miles in circumference, and its highest point nearly 800 feet above the sea. It is 40 miles to the N.W. of Raiatea, and is distinctly visible from the lower hills of that island. It is surrounded by a barrier reef of coral at the distance of about 3 miles, which encloses numerous small islets covered with cocoa-nut trees, but the lagoon is too shallow to admit vessels exceeding 150 tons burden.

The island is composed of hills wooded to their summits, and occasionally crested by cocoa-nut trees, but presenting ragged and mural cliffs to the sea-coast, especially one rocky mass on the S.W. side, *opposite the opening* in the reef, which rises 700 feet above the sea, resembling the ruins of a gigantic castle. Volcanic rocks, scorix, and slag abound; its smooth basaltic stones are much prized by the natives of all the Society group, to make pestles to prepare their food. The population of the island appeared small (about 1,000 in 1828); scattered habitations were along the coast, but the principal settlement is on the S.E. or weather side, where is also the residence of the chief Tairo. It contains a christian church. Swine, fowls, and especially yams, are abundant; water is scarce. The natives were exorbitant in their charge for supplies, and rather disposed to theft. This island is little frequented by foreign vessels; no ship before the *Tuscan*, in 1835, had visited it for two years.* The centre of the island is in lat. 16° 26' S., lon. 152° 12' W.

TUBAI, or MORU-IRI, is the northernmost of this group, and consists of some very small, low islets, connected by a reef, about 10 miles North of Bora-Bora, to which it was subservient, in the same manner as Teturoa, which it resembles, was to Tahiti. Perhaps it has no permanent inhabitants; but it is stated that, during the early visits of our navigators, it abounded with turtle, for which it was resorted to by the natives of the Society Islands, and also probably by some from the Low Archipelago. Mr. Bennett says that here he had a westerly wind. The North point of the reef is in lat. 16° 11' S., lon. 151° 48' W.

One other island is stated to have been found by Quiros, that is, *Peregrino*; but M. de Fleurieu says it is most probably the same as the Scilly Islands of Wallis.

CHAPTER XXV.

ISLANDS BETWEEN LATITUDES 10° AND 20° SOUTH.

IN this chapter we shall include those scattered islands and more connected groups which lie between the Society Islands and the Feejee Islands, which form the subject of the next chapter. The Cook Islands and the Tonga Islands, which lie on the parallel of 20° South, have been before described.

FLINT'S ISLAND was discovered in 1801. By some it is considered to be the *Peregrino* of Quiros; but, from Torres and Torquemada's description of *Peregrino* being 8 or 10 Spanish leagues from North to South, this is unlikely.

* Bennett's Whaling Voyage.

It has been examined, and its position fixed by the United States' Exploring Expedition.*

Flint's Island, situated in lat. 11° 25' 43" S., and lon. 151° 48' W., is of small size, being only 1½ miles in length from N.N.W. to S.S.W., and thickly wooded : high breakers extend off its point for some distance, and the surf was so high, that it was deemed impossible to land with a boat. No inhabitants were seen. The current was found to be setting to the westward.

WOSTOCK ISLAND was discovered by Capt. Bellingshausen in 1820. He places it in lat. 10° 5' 50" S., and lon. 153° 23' W. There is no doubt but that it is the same island seen by the American Capt. Stavers in 1821 and 1825, and also *Anne Island*, both of which are placed among the doubtful islands by Krusenstern (Supp., p. 158). It is called *Stavers' Island*, also, by Capt. Wilkes, who places it in exactly the same position as Bellingshausen. It is a low sandy islet, with a lagoon. It is well wooded, half a mile in diameter, of an oval shape, with heavy breakers surrounding it, which prevented the possibility of landing on it.†

MOPELIA ISLAND (*Mopihá*) was named by its discoverer, Capt. Wallis, *Lord Howe's Island*, July 30, 1767 ; but as this name is repeated in several parts of the Pacific, the native name, as above, is to be preferred ; this was given to it by Cook. According to Wallis, it is 10 miles long and 4 miles broad. Cook's position of it is, lat. 16° 46' S., and lon. 154° 8' W., differing only 5' from the longitude of Wallis. According to Commander Hamond, of H.M.S. *Salamander*, it is in lat. 16° 50', and lon. 154° 21' W.‡

PALMERSTON'S ISLAND, discovered by Cook in his second voyage,§ is a group of small islets, nine or ten in number, lying in a circular form, and connected by a coral reef. They are covered with trees, but no water was found.|| By the observations made in the French corvette *Bucephale*, October, 1843, the West islet is in lat. 18° 5' 50" S., lon. 163° 10' E. ; and the N.E. islet in lat. 18° 1' 10", and lon. 163° 6' ; results very nearly coinciding with those of Cook.¶

BELLINGSHAUSEN ISLAND was discovered by Capt. Kotzebue in 1824. He gives its position as lat. 15° 48' S., and lon. 154° 30' W. It is a low coral island, uninhabited, of a triangular form, richly covered with the usual vegetation, with the exception of cocoa-nut palms. Birds are very abundant and very tame. There is no opening into the lagoon, but the tide flows into it over the reef.**

SCILLY ISLANDS were discovered by Capt. Wallis in 1767. They form a group of small islands, which, being very low, are exceedingly dangerous. He

* Krusenstern, vol. i. pp. 27-8 ; Wilkes, vol. iv. p. 277 ; Mr. H. Thompson, R.N. ; *Nautical Magazine*, 1848, p. 419.

† Krusenstern's Supplement, pp. 4, 17, and 158 ; Wilkes, vol. iv. p. 277.

‡ *Nautical Magazine*, 1847, p. 379.

§ Vol. ii. pp. 2-3.

|| Third Voyage, vol. i. p. 217, *et seq.*

¶ *Nouvelle Annales des Voy.*, 1845, part iii.

** Kotzebue's *New Voyage* ; *Nautical Magazine*, 1838, p. 738.

places them in lat. $16^{\circ} 28' S.$, lon. $155^{\circ} 30' W.$; but Admiral Krusenstern corrects this longitude to $156^{\circ} 10'$.

Some islands have been placed on the charts in this neighbourhood, stated to have been discovered by Roggewein in 1722. His journal is given in Burney's *Chronological History*, vol. iv. p. 569, *et seq.* These are *Bauman Islands*, *Roggewein Islands*, *Tienhoven Island*, and *Groeningen Island*. The situations, or supposed situations, of all these, have been carefully sought over by Capt. Kotzebue, and also by the United States' Exploring Expedition, but without any success. As it is very evident that the assigned positions may vary several degrees from the truth, it is more than probable but that they are identical with some known islands. Still their existence is open to question.*

GRAND DUKE ALEXANDER or *Reirson's Island* was discovered by Capt. Bellingshausen in 1820; and again, in 1822, by Capt. Patrickson, who calls it by the latter name. Bellingshausen places it in lat. $10^{\circ} 2' S.$, and lon. $161^{\circ} 9' W.$ It is 2 miles long North and South, and is inhabited.

HUMPHREY ISLAND was discovered October 13, 1822, by Capt. Patrickson, in the *Good Hope*; it was not seen, as the other island was, by Bellingshausen. It is also inhabited, and is in lat. $10^{\circ} 30' S.$, and lon. $161^{\circ} 2' W.$ (or by Capt. Patrickson, $160^{\circ} 55'$.)†

SOUWOROFF ISLES, a group of several small islands, were discovered in 1814 by Lieutenant Lazareff, commanding the *Souworoff*, a vessel belonging to the Russian American Company. Lat. $13^{\circ} 20' S.$, lon. $163^{\circ} 30' W.$ ‡

GENTE HERMOSA (*Handsome People Island*), discovered by Quiros in 1606, is in this vicinity. Mendaña also, in 1595, discovered the Islands of San Bernardo. The last are described as four low islands, 12 leagues in circumference, surrounded on all sides by rocks and breakers. Of course, in these older observations there are very great discrepancies. Admirals Burney and Krusenstern are each inclined to the opinion that these two groups (and they also include Danger Isles) are identical with each other. Whether they are the same as either Swain's Island or Bowditch Island, discovered by the American Exploring Expedition, is undecided, but the probability is great in favour of such a supposition.

DANGER ISLES were discovered by Commodore Byron, and are stated by him to be three in number, surrounded by rocks and breakers, and having a dangerous reef 9 leagues E.S.E. from them. His position is lat. $10^{\circ} 15'$, and lon. $169^{\circ} 28'$, which Krusenstern corrects to $165^{\circ} 58'$. Exactly in this longitude a similar group of three islands was discovered by Bellingshausen in lat. $10^{\circ} 54' S.$, lon. $165^{\circ} 54' E.$, but he did not see the reef to the eastward. Capt. Freycinet

* The speculations as to their locality will be found in Burney, vol. iv., as above; Fleurieu, in *Marchand's Voyage*, vol. iii. pp. 337—351; and Krusenstern, vol. i. pp. 286-7. See also Kotzebue's *New Voyage*; and Wilkes, vol. iv. p. 277.

† Krusenstern, vol. i. p. 296; and Supplement, p. 12.

‡ Krusenstern, *Mem. Hyd.*, vol. i. p. 15.

also saw them, and gives the lat. $10^{\circ} 45' S.$, lon. $161^{\circ} 10'$, which last Krusenstern supposes to be a typographical error.*

SWAIN'S ISLAND.—In lat. $11^{\circ} 5' S.$, lon. $170^{\circ} 55' 15''$, the United States' Expedition discovered a coral island, January, 1840, to which the name of Swain's Island was given. It is of coral formation, but has no lagoon; it is nearly round, and $4\frac{5}{8}$ miles in circumference; it may be classed with the high coral islands, and is elevated from 15 to 25 feet above the level of the sea. The sea breaks constantly on all parts, and no safe landing exists. With the exception of some groves of cocoa-nut trees, there were no signs of its ever having been inhabited. Pigeons were observed on it.†

RANGER ISLAND (?).—Capt. Worth, of H.M.S. *Calypso*, states that a small island is reported to exist by the whale-ship *Ranger*, of London, in lat. $11^{\circ} 35' S.$, lon. $166^{\circ} 45' W.$, but no authentic account of it could be obtained (December, 1848).

NASSAU ISLAND was discovered in March, 1835, by an American whaler of that name, Capt. Sampson. It is a low island; no appearance of inhabitants; water and wood plentiful; lat. $11^{\circ} 30' S.$, lon. $165^{\circ} 30' W.$ † It may be identical with Ranger Island.

SAMOA OR NAVIGATOR'S ISLANDS.

The Samoa or Navigator's Islands lie between the latitudes of $13\frac{1}{2}^{\circ}$ and $14\frac{1}{2}^{\circ} S.$, and the longitudes of 168° and $173^{\circ} W.$, and consist of four principal islands and five smaller, reckoning Rose Island to the eastward among the number. Krusenstern considers them to be the same as the Bauman Islands, discovered by Roggewein in 1721. However, there are many doubts as to this, and it is not of much importance. They were first seen, as now known, by Bougainville, in 1768, and by La Pérouse in 1787. Since that period they have been visited and described by Capt. Freycinet; Capt. Edwards, in the *Pandora*; Kotzebue, in the *Predpriatie*; and more recently and completely by Capt. Wilkes, in the U.S. Exploring Expedition, in 1839. To this latter source, and to the remarks of Capt. Bethune, R.N., we are indebted for the principal portion of the subsequent descriptions.

The whole of the group (excepting Rose Island) are of volcanic origin, and have remains of extinct craters, which are peculiarly visible at Apolima, Savaii, and the lake Lauto, on the ridge of Upolu, which is 2,570 feet above the sea. They are generally surrounded by coral reefs, which, in many instances, are much modified. The few harbours are generally situated within the reefs, but there are but two of primary importance in the group; that of Pago-Pago on the South side of Tutuila, which is a deep, land-locked basin, of easy approach and perfectly secure anchorage. This is the best port for the refitting of vessels,

* See Krusenstern, part i. p. 14; and Supplement, p. 13.

† Wilkes, vol. iv. p. 18.

‡ Nautical Magazine, February, 1836, p. 66.

or for any purpose requiring more than a passing visit. But Apia, on the North side of Upolu, in lat. $13^{\circ} 48' 56''$ S., and lon. $171^{\circ} 41' 0''$ W., according to Wilkes (see Bethune), is more convenient for temporary purposes or refreshment, as it is nearer to the fertile districts, and is also the place where the principal missionaries reside. To Apia the remains of the unfortunate and respected Mr. Williams, and also those of Mr. Harris, were brought by H.M. sloop *Favorite*, in 1839, from Erromanga.

The great disadvantage which these islands lie under, especially Upolu and Savaii, is the want of any approach to government. A code of commercial regulations was drawn up Capt. Wilkes, of the U.S. navy, for the whole of the Samoa group, and signed by some of the chiefs of Upolu, but there is no authority to enforce it. A harbour duty of five dollars is paid by all merchant ships to Pea or Poneis, chief of Apia, but is rather a private present than a claim. The whole of the population of Manua, and nearly all of Tutuila, have embraced Christianity. Tutuila has the advantage of some form of government, there being seven ruling chiefs who decide upon measures for general adoption.

The only staple, at present, is cocoa-nut oil; about 100 tons annually are made, the produce of a few weeks' labour; but it might be increased tenfold from the present trees, without referring to what might be done by cultivation. The islands seem fit for every tropical production, and there is a great quantity of rich level land in all. There are a few cattle on the island, most of them the property of Mr. Pritchard and Mr. Williams the U.S. consul; beef, yams, and pumpkins may, therefore, be reckoned on from them at moderate rates.*

Since the French have taken possession of Tahiti, as naturally might be expected, the English interests have declined, or rather removed, and the endeavour is to bring the trade, as far as possible, to this group, of which Apia is the centre, replacing Papiete in the former islands. The French still endeavour to rival the English and Americans in the infant commerce now rising here. They have two missions on Savaii, and two on Upolu; these, with the other Roman Catholic missions on Mangaia, Rarotonga, and Rotumah, form part of the diocese of M. Bataillon.†

To vessels requiring refreshments these islands offer abundant supplies of wood, water, and provisions of the usual kinds. A small quantity of tortoise-shell, procured at Savaii at times, cocoa-nut oil, and arrow-root, comprise all the articles which can be procured in any quantity beyond the necessary articles required by visitors. Poultry of all descriptions is plentiful, and pigeons abound, but are considered sacred. Fish may be taken abundantly, and a great variety in their vicinity.

The CLIMATE of the islands may be termed variable; and there is much bad weather, particularly during the winter months, when long and heavy rains, attended at times with high winds and northerly gales, are frequent. Destructive hurricanes also occur, sometimes blowing down the trees and destroying the houses. Although these severe hurricanes do not happen very frequently at the Samoan Islands, yet Capt. Wilkes says, that from reports he received, he

* Nautical Magazine, June, 1850, pp. 324—326.

† M. Dutaillis, *Annales Hydrographiques*, vol. i. 1850, pp. 149-50.

is disposed to believe that they occur very frequently between them and the Friendly Islands, where scarcely a season passes without some of the islands suffering from one of these awful catastrophes.

It would therefore be advisable for whaling ships to avoid cruising in the neighbourhood of these groups during the season of the year that these storms are liable to occur, viz., from the middle of December to the end of March. Some ships have been almost made complete wrecks of that were so unfortunate as to be overtaken by them.

Capt. Wilkes relates (vol. v. p. 9) the phenomena of one, December 12, 1840, from which it would appear that they take the character of the usual revolving storms, shifting from one point to another, accompanied by a great fall in the barometer. During its height an injured one, whose ordinary standing was 28 inches, fell as low as 24 inches. Another of these cyclones devastated the Island of Tutuila, April 4th—7th, 1850. It is described in the Nautical Magazine, December, 1850, pp. 677-8; it is said that the barometer fell to 27·80. In the centre of the island the wind shifted suddenly from N.W. to S.W., and left scarcely a tree or house standing. Therefore the now well-known cautions respecting these storms may serve to mitigate their effects, if attended to.

The air is more moist than that of the Society Islands, and the vegetation in consequence more luxuriant. Thunder and lightning are often experienced; but during the summer light winds and calms are the prevailing characters of the climate.

The *flood tide* among the islands sets to the westward; beyond its influence, on the southern side of the islands, a current generally prevails to the eastward; while it runs westward on the northern side. Vessels, therefore, when beating to windward, would find it to their advantage to keep on the southern side of the group, where there is not only a favourable current, but the winds would be found more regular, and calms less frequent.

The Samoans have been somewhat misrepresented, as being ferocious and treacherous. Though this may not be entirely without foundation, yet they possess many good qualities, and are very desirous of pleasing and exercising hospitality. The beneficial effects of the missionaries are more evident here than at Tahiti. The white visitor will, therefore, find his way in a great measure prepared for him, and it is sincerely to be hoped that he will not abuse the privilege.

The islands collectively contain an area, according to the American estimate, of 2,650 square miles, and a population of 56,600; of whom 14,850 have embraced Christianity, and 12,300 attend the schools; besides this, two-thirds of the population belong to the Christian party.

ROSE ISLAND is the easternmost island of the Samoan group. It was discovered by Freycinet, and so named after his wife, who accompanied him. Afterwards (in 1824) it was seen by Kotzebue, who gave the name of his first lieutenant, *Kordiukoff*, to it, being unaware of Freycinet's discovery. He describes it as exceedingly dangerous, from its low elevation; but Wilkes, October, 1839, says that at first it resembles a round knoll of land, but which is in reality a clump of trees. It is a low, small, annular coral island, inundated at high water, with the exception of two small banks, one of which is covered with

trees. There is an entrance (4 fathoms) into its lagoon on the S.E. side. The tide rises $4\frac{1}{2}$ feet, the flood setting eastward. In stormy weather the sea must make a complete breach over the reef.*

Sir Edward Belcher says :—" *Rose* or *Middleton Island* does not exceed 30 feet in height, is of a very soft spongy soil, on a slaty micaceous shale, intersected by quartz dykes. A few fuci, land shells adhering to ferns, and three small alca, comprised our collection. The ripples I had observed were found to arise from ledges of rock, on which as little as 2 fathoms were found. The tide was ascertained to set—flood, N.E.; ebb, S.W. Some fine halibut were hooked."†

Capt. Mignon, of the French ship *Jupiter*, says that the sand-banks extend more than 2 miles to the W.S.W., and that it looks very dangerous to approach too near.‡ It is in lat. $14^{\circ} 32' S.$, lon. $168^{\circ} 9' W.$

MANUA (Wilkes), *Omanooau* (Arrowsmith), is the easternmost of the principal range of islands, and was called *Opoun* by La Pérouse. It has the form of a regular dome, rising precipitously from the water to the height of 300 or 400 feet, and then more gently to 2,500 feet. It is 16 miles in circumference, is covered with a luxuriant vegetation, and has many cocoa-nut groves on its N.W. side. Its area is about 100 square miles. The principal settlement (*Tau*, Capt. Bethune) is on the N.W. side, and there is anchorage for a vessel near the shore, with a cove to land in. The natives are very willing to trade, "bacca" and fish-hooks being in great request by them. These islands furnish pigs, fowls, sweet potatoes, fruit, and some taro. Many running streams were seen coursing down the sides of the island

OROSENGA, OLOOSINGA, or ORISEGA, which is the *Leoné* of La Pérouse, is a narrow ledge of rocks, rising nearly perpendicular on both sides, and is 3 miles in length. It is the residence of the chief of the islands, in consequence of its being easily defended. He lives on the N.W. side. The coral reef around it differs from most others, and has been apparently upheaved 15 or 20 feet, for it consists of two regular shelves, one beyond the other.

OFU lies to the westward of Orosenga, and is the *Fanfoué* of La Pérouse. There is a passage for boats of a quarter of a mile wide between, and anchorage on the western side. Ofu resembles Orosenga, and has but few inhabitants. There is a small and comparatively low islet off its western end, near which is an anchorage.

TUTUILA is the *Maouna* of Bougainville, and has acquired an undesirable, and it is now believed an undeserved, reputation from the massacre of the Comte de Langle, M. de Lamanon, the naturalist, and the rest of a boat's crew belonging to La Pérouse's expedition. This occurred from one of the natives having been shot on board the *Astrolabe*, when the indignant natives retaliated in this way on the watering party. Subsequent experience has proved that the bad character given to these people in consequence does not really belong to them.

The Island of Tutuila, or, as it is called by Capt. Edwards, of the *Pandora*, *Tootooellah* and *Tutyella*, is high, broken, and of volcanic appearance. It is 17 miles long, and its greatest width is 5 miles. The Harbour of Pago-Pago

* Krusenstern, vol. i. p. 251; Supplement, p. 81.; Wilkes, vol. ii. p. 64.

† Voyage of the *Sulphur*, vol. i.

‡ Annales Hydrographiques, 1850, vol. i. p. 396.

(Pango-Pango) penetrates into the centre, and almost divides the island into two parts. It is less varied than the Society Islands, and its highest peak, that of *Matafoa*, is 2,327 feet above the sea. The spurs and ridges that form the high land are precipitous, sharp edged, and frequently rise in mural walls from the water to the height of 300 or 400 feet, showing the bare basaltic rock. Above this height the surface is covered with a luxuriant vegetation to the very top of the mountains; the cocoa-nut tree and the fern give the principal character to the beautiful scenery.

Tutuila is thickly settled round its shores, and particularly at its south-western end, where, according to Capt. D. Bethune, the large and flourishing village of Leoné reckons 10,000 inhabitants. This end is lower and more easily cultivated than the eastern, which is high and rugged. The only communication is by the sea-shore, the hills being too precipitous and difficult of ascent to pass over.

It has many desirable ports or bays on its North side, where vessels may obtain wood, water, and supplies. The best and safest port, however, is Pago-Pago,* on its South side, which affords a safe harbour for vessels to overhaul, and where supplies may be obtained in abundance.

PAGO-PAGO HARBOUR is one of the most singular in all the Polynesian Isles. It is the last point at which one would look for a place of shelter; the coast near it is peculiarly rugged, and has no appearance of indentations, and the entrance being narrow, is not easily observed. Its shape has been compared to a variety of articles; that which it most nearly resembles is a retort. It is surrounded on all sides by inaccessible mural precipices from 800 to 1,000 feet high. The lower parts of these rocks are bare, but they are clothed above with luxuriant vegetation. There are two breaks in the precipice, one at the head of the harbour, and at *Pilot's Cove*. The harbour is easy of access, and its entrance, which is about a third of a mile in width, is well marked by the *Tower Rock* and *Devil's Point*. Capt. Bethune, R.N., says:—"It may be distinguished by lying betwixt two hills: that on the West conical; that on the East square or elliptical."

About 3 miles† to the southward, off the mouth of the harbour, there is a coral bank half a mile long, on which the sea breaks in stormy weather. The least depth found on it was 4½ fathoms, and this depth increases eastward toward the Island of *Anuu*. About half a mile within the entrance of the harbour it bends at right angles. In this position, surrounded by cliffs, the firing of a gun produces a remarkable reverberation, resembling loud peals of thunder.

A white pilot (Edmund Foxall) usually came off (1839) to vessels when within 2 or 3 miles of the harbour, upon a signal being made.

The Harbour of Pago-Pago, though easy of access, is extremely difficult to leave, in consequence of the S.E. trade winds blowing directly in, and rendering it necessary to make short tacks. Indeed a vessel no sooner gets headway on one tack than it is found necessary to tack again. The sea is often heavy at

* It is sometimes called Cuthbert's Harbour, after the commander of the first ship that entered it.—Capt. D. Bethune, R.N.

† Wilkes; Capt. Bethune says, 1½ miles S.S.E. of the entrance. Capt. Worth, of H.M.S. *Calypso*, was told that a shoal existed about sixteen miles South of the South point of Tutuila, 848.

the mouth of the harbour, and the shore is lined with a narrow coral reef all around it.

To the foregoing by Capt. Wilkes, U.S.N., we may add the following by Capt. Drinkwater Bethune, R.N. :—" Within the entrance [lies a rock with 10 feet water on it. I have requested the missionary and the pilot to have two beacons erected as a mark for this. Besides this there is no other danger under water. The prevailing wind blows in, and generally hauls over to the eastward as you run in. The land wind will bring you out, though many vessels hang by a warp, get their anchor, and then beat out. Coming out with the land wind keep over on the eastern side ; generally a puff comes out of the bay, which carries you out clear. Water may be filled at low tide, and floated at high water. Pigs and fruit are to be obtained." *

The village of Pago-Pago contains about thirty dwellings, a council or *fala*-tele house, and a large church. It is the residence also of a missionary.

MASSACRE BAY, the scene of La Pérouse's disaster, is on the North side of the island, and from Pago-Pago to the watering cove is a walk of fifty minutes. Off the East end of the island is the Islet of *Anuu* or *Aunuu*, 5 or 6 miles in circumference, having 500 or 600 inhabitants, and off its western point is a single rock above water.

The climate of Tutuila is mild and agreeable, particularly at Pago-Pago, where the temperature is lower than it is elsewhere on the island, in consequence of its being overshadowed by the clouds which hang on the land. There is usually a fine breeze, which sets in about ten o'clock and continues until sunset. There is a good deal of rain during the year, but there does not appear to be any particular rainy season ; they are liable to high winds during the winter months.†

UPOLU (*Ojalava*, *Oahtooa*, *Ojatava*, or *Opoloo*, as it has been called) is the next in succession to the westward, and is 36 miles from Tutuila. It appears much richer and more fruitful than the other islands of the group, and may be described as of moderate height, rising gradually in a succession of ridges from a low shore. Here and there broad and fertile valleys are seen, with numerous streams falling from the mountains in cascades. The eastern portion of the island is much more rugged than the western ; the main ridge runs East and West, and ridges or spurs run back to it from the North coast in a S.E. direction. The shore is lined with a coral reef, which is now and then interrupted by channels, and forms snug and convenient harbours. The South side of Upolu,

* In addition to the preceding, the following directions by Mr. Peter Steward, commander of the bark *Montreal* (April, 1837), may be useful :—" On entering the harbour you must steer for the weather bluff, as a sunken rock lies nearly in mid-channel, between the East bluff and the small island that you will have on your larboard beam ; thus run along the weather or eastern shore until you have another small island well open on your larboard bow ; then edge over toward the small island, as there is another sunken rock that lies abreast of a small village that you will then have on your starboard bow ; there is no danger off the island but what is seen. After you have passed the small island you will see a native village on your larboard hand, for which you can haul in, and anchor abreast of, in 18 or 20 fathoms water, or you may run to the head of the harbour, and anchor in 5 to 7 fathoms water ; it is all good holding ground, of blue clay, and sheltered from all winds, being completely land-locked, and as smooth as a mill pond. There are two or three good watering places, and wood is plentiful along the shore. By making the native chiefs a small present they will cut your wood, load your boats, fill your water casks, and roll them down to the beach."—*Nautical Magazine*, February, 1838, p. 120.

† *Nautical Magazine*, 1840, pp. 757.

like that of Tahiti, is much more luxuriant than the northern, which is owing to a similar cause—that it receives more moisture from the prevailing winds. It has been the sphere of much useful missionary exertion; and the late Mr. Williams, the well-known author of the interesting Polynesian Researches, lived at Fasetootai, about 20 miles West of Apia, on its North side.

Off its eastern end is a small and moderately high island, covered with wood, which La Pérouse called *Ile de Pêcheurs* (Fishermen's Isle), from some canoes employed when he passed.

The following account of the island is given by Capt. Sir Everard Home, Bart., who visited this part of the Pacific in September, 1844 :—

“ Approaching the Island of Upolu from the S.E. (it is the centre island of the group) it appears to be of considerable extent and height, resembling the Island of Timor, the extremities tapering to long points. The body of the island is of very irregular form, being broken into sharp peaks and hummocks, one great chasm appearing to divide the island nearly into two, and one peak being very remarkable. The scenery of some parts of the South side of this island may be called truly magnificent. Off the East extreme there are two islands; that nearest Upolu is the largest, and has a peak; the eastern end of it is rather bluff; the island appears to be connected with the main land by a reef. The southern island is smaller, has its two extremes nearly alike; it has no peak, but a large round hummock, which may almost be called a saddle. The night of the 23rd was very fine: we stood off and on until morning, when we stood in and passed round the eastern end of the island and outside of the small islands before mentioned. To run for the anchorage off Apia, a ship should not have less than four hours daylight before her. It is necessary also to be well to windward, for, with the breezes which blow here, a day may be required to regain the loss of a few hours. Boats of European rig were seen passing along the shore. The pilot signal was made, and as no attention was paid to it, a gun was fired to enforce it, upon which a canoe, with five persons who were fishing, immediately paddled to the shore, hauled her up, and left her. Upon this part of the island there is a deep opening, much resembling that seen yesterday, with which it corresponds. There are many high peaks, and the North side may be considered mountainous; there is, however, a great deal of level land, and land that is in gentle hills and slopes. The island is covered with timber to the top.

“ Not liking to run to leeward without some certain knowledge of the position of the harbour, I sent a lieutenant on shore to make inquiries; he returned with information upon that point, and announced that the name of the place where he landed was *Sufibufi*, and that there was another village farther West, called *Sutufata*, and that the people were alarmed, as they believed the ship was French, coming with priests to make them change their religion. There was a Portuguese pilot at the place, but he was too much alarmed to come off to the ship. We ran down the coast W. by N. for the anchorage, which was 15 miles to leeward. Apia lies under the last mountain excepting one from the West end of the island, which terminates in a long, low point. On the mountain under which the village is placed there is a great cataract about one-third from the top; it can be seen from 12 to 14 miles at sea. Numerous large craters are seen in sailing

along the coast. The eastern end of the island is free from coral; sailing westward it gradually increases, as may be seen from the light colour under the water. Off Apia it extends farther from the land than on any other part of the coast; the sea breaks all along its outer edge. We ran down within half a mile of the reef.

"APIA is a reef harbour, the opening into which will show itself, and the eye, with attention to the helm, will be sufficient guide. Steering in, the cataract will be right ahead, and, with the village under it, the passage is clear; the depth of water decreasing gradually from 15 fathoms at the entrance to 8 fathoms. Anchor in 7 fathoms, and moor 30 fathoms each way, East and West. The harbour is small, and will not contain more than six moderately sized vessels in fine weather; the rise and fall of the tide are about 6 feet. Water here is most abundant and easily obtained, a river running on each side of the village. Pigs, poultry, excellent yams, and firewood, are to be had in plenty."*

The town is pleasant. A neat church, a saw-mill, and other good buildings, are among the improvements of the place. Near the church are deposited the remains of the lamented missionary, Mr. Williams, and of Mr. Harris, brought from Erromanga.

FAGA LOA HARBOUR lies on the N.E. side of the island, and is 3 or 4 leagues from the East end of it. Capt. Bethune, R.N., who had it examined, says:—"Two or three vessels have been in, but I cannot recommend it as an anchorage." It has been condemned by Capt. Wilkes, and an official notification from the American and British consuls, dated Apia Harbour, March, 1846, warns any vessel from entering, except on her own responsibility.†

MANONO ISLAND is enclosed within the sea reef of Upolu, at its West end, and was called by La Pérouse *Platte Island*. It is covered with forests throughout its whole extent, and is about 4 miles in circumference. It has about 1,100 inhabitants, and is the station of an English missionary. It is identified with the political history of all the other islands of the group, and has held the supremacy. This is owing to the possession of the natural fortress of Apolima (Aborima, or Poreemo), lying between Manono and Savaii. This is evidently the crater of an extinct volcano, and is a ring of perpendicular cliffs, broken down at a single point on its northern side, affording a passage for only one boat at a time to a basin within. Its highest part is 472 feet above the sea; and in the centre of the island is a native village. Soundings extend to it from Savaii and Upolu. The coral reef attached to it is but small. Kotzebue calls it the *Cock's Comb* (*Crête de Coq*).

The distance from Manono to Apolima is a short mile: from the West end of Manono the reefs extend about one-eighth of a mile, terminating in a small islet, called *Nulopa*. The remainder of the channel appears clear. H.M.S. *Conway* ran through it. From Nulopa the reef runs southward. A small rock lies off the eastern end of Manono.

* Nautical Magazine, April, 1850, pp. 218-9.

† Two shoals are said to exist off the North side of Upolu: one off *Moatua*, about 7 miles North, about 3 fathoms; one off *Utumanu*, about 6 or 7 miles due North, also about 3 fathoms.—Capt. Worth, R.N., 1848.

Outside the apparent line of the reefs there exists, to the N.W. of Apia, and about 2 leagues from the land, a shoal, on which M. Dutailis found 22 fathoms on the outside and 12 to 13 fathoms in the centre.

M. Dutailis advises vessels proceeding to the West to pass rather to the North of Savaii than through the channel separating this island from Upolu, at least to gain a steady breeze. You are drifted in it by strong currents. In the night of the 4th to 5th of December, 1847, during a dead calm, he was obliged to get the boats out, and to tow the vessel off Apolima, on which the swell and the current were driving her.*

From Apolima to Savaii, the westernmost of the group, the distance is about 7 miles, 4 or 5 miles of which are clear for ships. About one-eighth of a mile West from Apolima is a small rock, and the reef runs off from Savaii 2 or 3 miles.

SAVAII is the westernmost and largest, though not the most important, of the Samoan group. Capt. Edwards, of the *Pandora*, calls it *Chatham Island*. It is called *Shaviè* and *Oteewhy* by La Pérouse, and *Pola* by Kotzebue and others.

It is about 40 miles in length and 20 in breadth. It differs from any of the others in its appearance, for its shore is low, and the ascent thence to the centre is gradual, except where the cones of a few extinct craters are seen. In the middle of the island a peak rises above 4,000 feet, which is almost continually enveloped in clouds, and is the highest land in the group. Capt. Wilkes saw it at the distance of between 50 and 60 miles.

The interior of the island is rarely entered, even by natives, and has never been penetrated by strangers. Capt. Sir Everard Home says that Savaii is the finest and most valuable island he had seen. It produces, spontaneously, the citron, nutmeg, indigo, coffee, and sugar-cane.† The only settlements are on the shore. Another marked difference between Savaii and the other large islands is the want of any permanent streams, owing, perhaps, to the porous nature of the rocks. Water, however, gushes out near the shore in copious springs. The coral reef attached to this island is interrupted to the South and West, so that the surf beats full upon the rocky shore. There are, in consequence, but few places where boats can land, and only one harbour for ships, that of *Mataatua*, but this is exposed to N.W. gales.‡

The South side of the island is rocky and iron-bound, with a heavy surf breaking on it. Towards the western end of the island the rocks around the points are worn into cavities, and the sea rolling into them produces innumerable spouts of water.

Near the East point of the island is the large bay of PALUALE, a missionary station. The village is approached by a boat passage through the reef. Near the N.W. point of Savaii is the large and beautiful village of *Felialupo*, with a snug little cove for boats. A native missionary resides here. The next inlet on

* M. Dutailis, *Annales Hydrographiques*, vol. i. p. 149.

† M. Dutailis says there is a tree found in the archipelago which possesses a remarkable property; it is called *Mamorea*, and the men who work it become intoxicated; animals which lie on the wood are also much affected by it.

‡ Capt. Sir Everard Home says the water comes from the hills in such great torrents, that its counter-action, flowing out, beats down the sea rolling in; the harbour thus is kept quiet, and the ship rises to the fresh. In this way ships will ride out the heaviest gales in perfect safety, without lightening their cables, which, he was informed, was the case when the American squadron were in the harbour in 1840.

the North side is that of *Asau*, a small and shallow entrance through the reef, forming within an extensive flat.

The BAY OF MATAATUA is off the North point of the island, and affords good anchorage, and it is the only place in the island where a vessel can stay with safety. Supplies of hogs, poultry, and vegetables, may be had in abundance; wood and water are easily obtained; the latter from copious springs near the beach. The bay is surrounded by a white coral beach, and the town of Mataatua is beautifully situated in an extensive grove of cocoa-nut trees. The houses are about 400 in number, and the people about 2,000, most of whom are heathens, but are courteous.

The Bay of Mataatua is much exposed at all seasons; but between December 1st and the end of March, when North and N.W. winds prevail, it is quite dangerous, and should not be visited.

M. Dutailis says that in the N.W. part there is a bay, where thousands of vessels might anchor in a depth of 5 to 9 fathoms. Unfortunately the only opening in the reef is closed by a bar, which leaves but a passage fit for a vessel of 4 or 5 feet draught. In the West there is anchorage in 12 and 13 fathoms, in a very open bay. Lastly, all along the North coast, at the distance of 2 or 3 miles, bottom may be found at the depth of 9 to 14 fathoms.

From information given to Capt. Worth, R.N., in 1848, a *shoal* exists about 40 miles West of the West point of Savaii, but we have no farther particulars respecting it.

SAVAGE ISLAND, or *Iniuë*, was discovered by Capt. Cook, June 20, 1774. He landed easily in a small creek on the West side, and taking post on a high rock, to prevent surprise, was attacked, both here and at the point, by the natives, "with the ferocity of wild boars." This reception occasioned its name. It is about 11 leagues in circuit, of a round form and good height, and is steep-to. All the sea-coast, and as far as could be seen, was wholly covered with trees and shrubs, among which were some cocoa-nut trees. To judge of the garment by the skirts it cannot produce much, for so much as we saw of it consisted wholly of coral rocks all overrun with woods and bushes. In this island not only the loose rocks which cover the surface, but the cliffs which bound the shores, are of coral stone, which the continual beating of the sea has formed into a variety of curious caverns, some of them very large; the roof or rock over them being supported by pillars, which the foaming waves have formed into a multitude of shapes, and made more curious than the caverns themselves.* Its South point is in lat. 19° 10' S., lon. 169° 50' E.

The COCOS and VERRADERS ISLANDS were discovered by Le Maire and Schouten, May 11, 1616. The first is a high island, one entire mountain, resembling the Moluccas, and covered with cocoa trees; hence its name. Its native name is *Niua-tabu-tabu*, and is about 2,000 feet high. It was seen by Wallis, July 13, 1767, who called it *Boscawen Island*. It is in lat. 15° 54' S.,

* Voyage to the South Pole, &c., vol. ii. pp. 5-6.

lon. $173^{\circ} 48' W.$ *Verraders Island* is much lower and of greater length. The ships which discovered it, having anchored off it, began some friendly intercourse with its inhabitants, which having continued to some extent, they became bolder, and approached apparently pacifically, with 700 or 800 men, but began to attack them. Hence it was called *Verraders* or *Traitor's Island*. Capt. Wallis called it *Keppel Island*. Its position is about lat. $15^{\circ} 57' S.$, lon. $173^{\circ} 58' W.$

These islands were visited by H.M.S. *Zebra*, in 1832 (?). The population was about 1,000. Cocos or Boscawen Island was under the subjection of the chief at Keppel or Verraders Island. The stock on the latter was very little. Yams and plantains in abundance, and very fine.*

THREE ISLANDS are marked on Arrowsmith's chart, in lat. $18^{\circ} 8' S.$, lon. $169^{\circ} 20'$. They are populous.

PROBY ISLAND was discovered by Capt. Edwards, in the *Pandora*, and is probably the *Goede Hoope Island* of Schouten, who says this island is full of black cliffs, whose tops were covered with vegetables, and well stocked with cocoa trees. There is some doubt as to the islands hereabout, as we have no recent account of any close examination of the vicinity, so there may be more. The *Consolation Islands*, discovered by Maurelle, are hereabout, possibly the Cocos and Verraders Islands. On the charts Proby Island is called *Anoofou*. (*Niuafou*?) Lat. $15^{\circ} 53' S.$, lon. $175^{\circ} 57' W.$

BRINSMADE ISLAND is probably the same. It is said to have been discovered in 1840 by Capt. Wood, of the *Richmond*. He describes it as a large island, well wooded, and apparently thickly inhabited, judging by the lights seen on shore at night. Lat. $15^{\circ} 37'$, lon. $175^{\circ} 25' W.$ †

L'ENFANT PERDU is an island discovered by Bougainville, May 11, 1768, but only seen at the distance of 7 leagues: there does not appear to be any account of its having been since seen. He thought it was double, and that it was the Horn Islands of Le Maire and Schouten. But Krusenstern thinks that its position is against such a supposition, and that it is really a separate island. Bougainville's position is lat. $14^{\circ} 20' S.$, lon. $176^{\circ} 40' W.$, but it is not to be depended on.

HOME BANK.—Sir Everard Home, in H.M.S. *North Star*, in September, 1844, left the Samoa group for the westward, and looked for a shoal between them and the Wallis Islands, but could get no bottom with 100 fathoms in the reported position. But on the following day, at noon, they were upon one of great extent; the depth of water 13 fathoms, nor did it appear to have less. No broken water could be observed. The latitude, by observation, was $12^{\circ} 53' 8''$, longitude, by chronometer, $175^{\circ} 31' E.$ ‡ Capt. Reynard, owner of the American whaler *Lalla Rookh*, says it is about 6 miles long W. by S., and 4 miles broad.

* Nautical Magazine, 1833, p. 535.

† The Australian Register, and Sun newspaper, July 25, 1840.

‡ Nouvelles Annales des Voyages, August, 1845, p. 236.

Ten fathoms were found, but in many parts there appeared to be less water. The position is identical with that above given.*

UEA, UVEA, OR WALLIS ISLAND.—Wilkes places in lat. $13^{\circ} 24' S.$, lon. $176^{\circ} 9' 22'' E.$ It was discovered by Wallis in 1767, and it is probable that it is the same as that discovered by Maurelle, April 22, 1781, and which he places more than $3\frac{1}{2}^{\circ}$ to the East; but, as in the case of Pylstaart's Island, he is this amount in error; this is, perhaps, confirmatory. Wilkes says that instead of a single island, as might be expected from the name, there are nine separate islands, varying in circuit from 1 to 10 miles, and enclosed with one extensive reef. The land is in general high. The entrance to the lagoon is on the South side of the group, and it is stated that there is ample room for a ship to pass within the reef. Wood, water, and refreshments, may be obtained.† It is said that the Roman Catholic missionaries, who were expelled from Tahiti, were landed here.

The following is the French account of it:—The Island of Uvea is the only one inhabited. The others, infinitely smaller, which are grouped around it, are not, properly speaking, but places of relaxation, where the sick or invalids go to breathe a purer air, and to get beyond the reach of the myriads of troublesome mosquitoes.

The passage to reach the anchorage, although very narrow, and forming a course for a strong flow and reflow, is nevertheless safe enough for a vessel, with a favourable breeze, and carrying her upper sails, to have nothing to fear from the surf or the calms suddenly occurring from the Island of Fenoua-Fou, and the movements of the tides.

The corvette *Ariadne* anchored in 22 fathoms, with Noukou-Kimoo bearing $N. 2^{\circ} W.$, and Fenoua-Fou to $S. 39^{\circ} W.$ In this position she was about 12 miles from Mona (St. Joseph), and 5 or 6 miles from the watering place.

If you wish to repair the ship, or take much water, or to refit, it would be better to take the anchorage where the *Embuscade* was half rebuilt, and where the *Arche d'Alliance* was partly hauled on a sort of gridiron. Some coral banks separate these two points, but they show themselves by the colour of the sea, and leave between them a very fine channel.

The Island of Uvea has 3,000 inhabitants; 2,700 of them are converted to the Roman Catholic, and 300 to the Protestant, religion. The Catholics are collected into three parishes, St. Joseph in the South, Mataoutou and Lano in the North.

The soil of Uvea, with an appearance of rich vegetation, parches very quickly, exposed to the air and the sun's rays. After it has been cleared for three years, it loses its fertile qualities, and becomes pure sand: the following is the method of culture:—

* Nautical Magazine, May, 1846, p. 270.

† In the Nautical Magazine, for July, 1833, pp. 376—380, is an account of the massacre of the crew of the *Oldham*, in March, 1832; but this catastrophe was clearly caused by the aggression of the captain of the *Oldham* and his crew robbing the natives, and forcing away their women. Twenty-eight of the crew were killed, including the captain and all the mates, in the affray. H.M. corvette *Zebra*, Capt. Macmurdo, went to ascertain the facts above related: and the master, Mr. Duncan, who gives a description of the island in his journal, places it in lat. $13^{\circ} 22'$, and lon. $176^{\circ} 4'$.

The bushes, herbage, &c., are cut near to the surface and left to dry on the spot, and then set fire to. The fire reaches the surrounding trees, dries the roots, and destroys the foliage. Then, with a pointed stake, three or four holes are made around the trunks, and in them are planted yams. The climbing stems of these are supported by these dead trunks, and at the end of six months they are gathered, and the ground planted with bananas, and thus these two crops are alternated by the same work.

It is known that in Oceania the best land is that which produces the boura (hibiscus). The land on the South and East of Ouvea is thus the most fertile. That of West and North is exclusively the property of the lowest class of the population.

The whalers, who formerly used to come in great numbers to this group, do not touch here now, the natives, therefore, have a difficulty in procuring those articles which their contact with Europeans, and their new religious notions, render indispensable. During the stay of the *Ariadne* articles of confectionery were in the greatest demand. Passage Isles, lat. $13^{\circ} 24' 14''$ S., lon. $176^{\circ} 9' 43''$ W. ; variation, $11^{\circ} 1' 20''$ E.*

The following remarks are made on it by Capt. Sir Everard Home :—

“ At daylight on September 5, 1844, stood in, and soon after saw the island bearing N.W. ; it is of moderate height ; the surface varied ; one hill is seen of irregular form and higher than the rest ; eastward of it there are islands extending to a considerable distance. Drawing in with the land from the southward, a long, low island appears eastward ; and westward the hill above mentioned, with a small island on each side of it. They are all covered with trees, particularly cocoa-nut. The remarkable rock, called the *Sail Rock*, from its exact resemblance to a boat under sail, whichever way it is viewed, was reported as a boat coming out : the village was seen, and appears to the naked eye like a cliff, or patch of barren rocks amongst the green foliage which surrounds it.

“ There appears to be one continued reef all along the island. Being to windward, and no boat coming off, at half an hour before noon we ran down westward to the small island, round which was the entrance between it and the hill before mentioned. Soon after noon a pilot was received, a native of France ; at three p.m., when it was slack water, stood in N. by E. $\frac{1}{2}$ E. for the opening, a channel of about 120 yards in width, through which the tide runs at the rate of about 8 miles per hour. Great attention is required at the helm ; the length of this narrow channel is about a quarter of a mile.

“ Having passed the reef, haul up N.E. by E. Two patches of coral will be seen, pass between them ; that on the starboard hand will have 14 feet, the other 5 feet water upon it ; care must be taken to avoid the other light-coloured patches, for they are coral reefs and shoals ; the eye will be sufficient guide : the remarkable rock above mentioned will be seen ahead ; the anchorage is about a quarter of a mile South of it, in 22 fathoms, sand and coral, the *Sail Rock* bearing N. 9° E., and the centre of the hill, near the entrance, N. 74° W. The South side of the harbour is bounded by a line of low sandy islands, connected by coral

* M. Dutaillis, *Annales Hydrographiques*, 1850, vol. i. pp. 151-2.

reefs, upon which the sea continually breaks with violence. The land North, which is the largest of the group of islands, is high and apparently productive ; the islands are all well wooded ; no good water is to be obtained here. This anchorage is not good, the bottom being of coral mixed with sand ; the anchors hooking the coral are frequently lost, but the danger of the passage in or out, caused by the force of tide making through and the narrowness of the channel, is a sufficient objection to it. There is another passage on the West side, but fit only for small vessels ; the rise and fall of the tide 8 feet.

"The island is divided between Protestants and Roman Catholics. A Roman Catholic bishop has settled here, and made these islands a centre from which to spread that religion. The followers of the two religions were preparing to make war upon each other, and little information was to be gained here."*

HORN ISLANDS, or *Foutouna* and *Alofi* (*Allufatti* of former charts), were discovered by Le Maire and Schouten, May 19, 1616. They anchored on the South side of one of them, but do not say which, in a bay to which they gave the name of *Endraght*. Capt. Wilson, of the *Royal Admiral*, named a bay on the South side of the northern island *Schouten Bay*. Wilkes saw it in 1839, and says its highest point is 2,500 feet above the sea ; on its northern side many rocks are visible, and the whole surface appears bold and precipitous, affording, as far as could be perceived, little soil for cultivation. Cocoa-palms in considerable numbers, however, were observed on a low point projecting from its southern side.†

The Island of *Foutouna* and that of *Alofi* (and not Alofa) are only separated from each other by a narrow channel. The land of these is very high, and incomparably more fertile than that of the Wallis Islands.

Singavi, the only anchorage of *Foutouna*, is exposed to the S.E. winds. The anchorage in it is not very safe. Water and provisions in abundance may be procured. They have a population of 1,100 inhabitants. Those of *Foutouna* are about 1,040 in number.

The Island of *Foutouna* is scarcely 8 leagues in circuit. It is under the sovereignty of two kings, both of them Roman Catholics, like their subjects. One of them is the famous Sam, the ex-disciple of the unfortunate Père Channel. This Sam has sailed several years with the English and Americans, and speaks their language.‡

* Nautical Magazine, April, 1850, pp. 222-3.

† Narrative of the United States' Exploring Expedition, vol. II. p. 159.

‡ M. Dutailis, Annales Hydrographiques, vol. I. pp. 152-3.

CHAPTER XXVI.

FEEJEE ISLANDS.

THE Feejee Archipelago is one of the largest and most beautiful of the Pacific Ocean. But it is of minor importance to the commercial world, from the character of the people inhabiting it. They are a fine race, shrewd and enterprising, but, at the same time, the most ferocious and ruthless cannibals that have been hitherto described. Their treachery and violence have nearly counterbalanced any advantage that nature has bestowed upon the islands they occupy, and consequently they have been hitherto but comparatively little frequented. Still they offer, with proper caution, many advantages to vessels frequenting these regions.

It is to Tasman that we owe the discovery of the Feejee Islands. On February 6, 1643, he saw eighteen or twenty small islands, surrounded by rocks and reefs. He called his discovery Prince William Islands and Hemskirk Reefs. These probably were in the eastern part of the group. The next navigator who visited them was Capt. Bligh, in 1789, during his boat voyage after the mutiny of the *Bounty*. He traversed the group, which had been previously known from report of the Tonga Islanders, from the eastward, passing between the two larger islands. The same commander, in his second voyage in 1792, also traversed the South part of the archipelago. The southernmost of the group, Turtle Island, was discovered by Cook in 1773. Capt. Wilson, in the missionary ship *Duff*, in 1797, has given a tolerably accurate delineation of a large portion of the eastern islands. Since that period many have visited and described the various islands.

Capt. D'Urville, in the *Astrolabe*, in 1827, spent seventeen days in examining the group, of which he furnished a far more exact knowledge than had been previously acquired.

It is to the United States' Exploring Expedition that we owe the most complete and recent account of this beautiful archipelago, and it is from the third volume of the narrative of their proceedings that a large portion of the ensuing descriptions have been derived.

Capt. Wilkes offers the result of the survey with confidence to the world ; "every portion of the group has been as thoroughly examined as is necessary for any nautical purpose, or for those of general geography." And again, "I am happy to know that we shall enable the navigator to visit this group without fear and with comparatively little danger, if he will but observe a proper share of caution ; and there is now open to him one of the best groups in the Pacific for obtaining supplies and refreshing his men after their arduous labours."*

* "We found the position of all the reefs and shoals through and amongst which we passed very correctly laid down in Capt. Wilkes' charts of the American Exploring Expedition, with the exception of Turtle Island, about which there is evidently some mistake, and the reefs and shoals within the Bay of Ambau ; his description, also, of the island, with the appearance, habits, and customs of the natives, is very faithfully delineated."—*Capt. Worth, R.N., H.M.S. Calypso.*

There is one very great blemish in Capt. Wilkes's account of this group: he makes not the slightest allusion to any of his predecessors in exploration—most assuredly a very necessary, yet simple, duty. The only mention made of any other labourer in the same field is in terms of would-be disparagement, which we conceive to be unworthy of so important an expedition. It is sufficient here to mention this: it is too obvious, on every page of his volume, to any one at all acquainted with other authorities.

According to the American survey, the Feejee group is situated between the latitudes of $15^{\circ} 40'$ and $19^{\circ} 30'$ S., and the longitudes of 177° E. and 178° W. It comprises 154 islands, 65 of which are inhabited. The remaining 89 are occasionally resorted to by the natives for the purposes of fishing and taking biche-de-mar. There are also numerous reefs and shoals.

The island which gives its name to the group is called by the natives Viti-Levu (Viti-Levu, D'Urville, &c.), that is, Great Viti. The Feejee islanders call themselves *Kāi-Viti*, in the same way that they call the inhabitants of Tonga *Kāi-Ton-ha*, and *Kāi Papalan-hi* all civilized people, or rather, all their visitors who wear clothes, and it is only these three races that they are acquainted with.

The origin of the name *Fidji*, *Fidgee*, or *Feejee*, or *Fiji*, is probably due to the Tonga islanders, who thus pronounce the word "*Viti*," and this even occurs among the Feejeeans themselves; they frequently saying, *Vitchi*, or *Fitchi-Levu*.*—(See *Journal de M. Gaimard, Voyage de L'Astrolabe*, vol. iv. p. 699.)

The reason, probably, of the great difference in the orthography as given by different writers may arise, in addition to the two languages above noticed, from the imperfect pronunciations of the natives themselves, from the custom of knocking out the front teeth, which is so frequently the case.—(See Campbell's *Voyage Round the World*, p. 210; and *Mariner's Tonga Islands*, *Intro.*, p. xliii.) In the elaborate paper by M. Gaimard, above quoted, there are given some comparative tables of the two modes (Tonga and Feejee) of pronunciation.

Of the NATIVES we cannot speak here in detail. They are of a different complexion to the Tonga Islanders, their neighbours, being nearly black. They are a fine race of men, and doubtless possessed of many good qualities, but they are preëminently bloodthirsty, ferocious, and cruel. Cannibalism is indulged in to an incredible extent, and this, not from the mere satisfaction of revenge, but as an appetite,—friend, relation, or foe, equally affording food to the more powerful. The ample descriptions given by D'Urville, Wilkes, and others, will furnish details of their revolting habits and customs. The numbers inhabiting the group of course cannot be very closely estimated; M. Gaimard making it 70,000, while Wilkes raises it to 133,000. Among this number there is some variety of race, and there are many Tonga Islanders resident on various islands. The most thickly populated of the islands are Ovolau and Kandabou.

* One difficulty in assigning the correct native names to the islands in the group is the variation in the orthography adopted by the different authors. Wilkes tells us that his names are written as they are pronounced (though without saying upon what system), and not according to the true construction of the language (vol. iii. p. 46). D'Urville received most of his information on this point from an intelligent native of the group Tamboua-Nakoro, and gives the names, of course, from the French system. In the added notes of M. Gaimard (*Voyage de L'Astrolabe*, vol. iv. part ii. pp. 709-10), there is a comparative table of the Feejeean and Tongese modes of pronunciation, from which it would seem that Wilkes has frequently adopted the latter.

In every communication with the natives it cannot be too strongly insisted on that *caution*, in the utmost degree, should be used. This should be the actuating principle of every one while in their vicinity, to guard against surprise or treachery. No canoes should be allowed to remain in any numbers close alongside the vessel, nor too many natives on deck at any one time. Every one should be properly armed and prepared for resistance, not concealing such readiness. Boat parties should not be too few in number, nor should they become detached from each other while on shore. And, although there is no necessity whatever for any violence in communicating with the islanders, yet, if it is seen that the means of resistance or defence are ready, they are not likely to be troublesome. With these proper precautions, there is no difficulty in procuring supplies and trading at the Feejees.

The group does not afford much encouragement for trading. A small quantity of biche-de-mar and tortoise-shell* are the principal commercial productions; sandal-wood is exhausted. The articles which are in request by the natives for the supplies which may be required are muskets and ammunition, and the usual attractions to savages, but their taste is capricious and varying. Though no profitable trade may be conducted here,† yet this group offers great inducements for the recruiting crews and refitting ships after long voyages, yielding abundant supplies, and great facilities for wood and water. The harbour of Levuka in Ovalau, near the centre of the group, which is the residence of all the white inhabitants, is the best adapted for this purpose.

EARTHQUAKES are not unfrequent; according to the white residents they generally occur in the month of February. Several shocks are often felt in a single night. The only place where there are any signs of volcanic heat is Savu-Savu, on the South side of Vanua-Levu; but several islands in the group exhibit signs of craters. One of these is at the West end of Kantavu. There are others at Nairai, Goro, and in the Ringgold Isles. The peaks, however, are usually basaltic cones or needles, some of which rise to the height of several thousand feet, and no running stream of lava has been seen occurring on any of the islands. It may consequently be inferred that the date of the formation of these islands is more remote than that of the other groups of Polynesia. Volcanic conglomerate, tufa, and compact and scoriaceous basalts, are found of every texture and colour, and in every state of decomposition. When decomposed, they afford a rich soil, which, clothed with a very luxuriant foliage, covers the islands to their very tops, clinging to every point where it is possible for a plant to take root. This rich vegetation gives a degree of beauty to the aspect of the whole group.

The CLIMATE of the Feejee group is well adapted to all the tribes of tropical

* The traders who come for tortoise-shell in *small* vessels to these islands run no little risk; the natives have frequently attempted to cut them off. To effect this they dive for the cable, and cut it if the wind is on shore, and drag it ashore if otherwise. The moment a vessel touches the land, she is considered as an offering to the gods, and all hands, as stated elsewhere, are invariably sacrificed. Tortoise-shell constitutes the chief article of trade in these islands, and is endeavoured to be monopolized by the whites resident in the group. Vomo is the principal seat of this trade.

† "On our way across the reef (Direction Island South of Vanua-Levu, Feejees) we saw a school of sperm whales. These begin to frequent the seas around these islands in the month of July, and are most numerous in August and September, and continue about the reefs and islands four or five months."—*Wilkes*, vol. iii. p. 194.

plants, and to not a few of those of the temperate zone in the more mountainous portions of the islands.

The climate of the islands, as is not unusual within the tropics, is very different on the opposite sides of the various islands. From the constant prevalence of the wind in one direction, the windward sides of the islands are refreshed by showers, and the result of this is that the weather side exhibits the tropical and luxuriant vegetation which is so remarkable in this group. The lee sides of the islands, on the contrary, have a burnt and barren appearance, from the want of the moisture brought by the atmosphere. The difference in temperature, however, is not great; under the two different circumstances the hourly difference found by the American observers being only two degrees. The mean temperature observed during their six weeks' stay at Ovolau in June and July, 1840, was 77·81°. The barometer stood at 30° 126 inches. The lowest temperature was 62°, the highest 96°.

The winds, from April to November, prevail from the E.N.E. to S.E. quarter, at times blowing a fresh trade-wind. From November till April northerly winds are often experienced, and in the months of February and March heavy gales are frequent. They usually begin at N.E., and pass round to the N. and N.W., from which quarters they blow with the most violence; then hauling to the westward they moderate. They generally last two or three days.

A tremendous storm destroyed the missionaries' house at Rewa, at Viti-Levu, February 25, 1840. Wilkes says it appears to be coincident with, if not part of, the gale that occurred at New Zealand, 1st March.—(Vol. iii. pp. 113, 321.) It began, February 22nd, at Viti-Levu at N.E., with much rain, veering to North on the following day, increasing with violent gusts. On the 24th the gale was the same, much rain and wind, hauling to westward at midnight of the 25th. It became N.W. in the morning, moderating, and clearing gradually off at southward. It was not felt at Tonga. If identical with the New Zealand gale the vortex was upwards of 600 miles in diameter.

The tides throughout the group appear to be very irregular, until they are closely studied. The flood sets in opposite directions on the eastern and western sides of the group. Thus, on the South side of Vanua-Levu it flows from the East as far as Buia Point, where it is met by the flood coming from the West. It is high water at Ovolau at 6^h 10', full and change. At Muthuata, 5^h 30'.

From the observations of the United States' ship *Porpoise*, and information obtained from the natives, there appears to be a continual current setting to the eastward, at the rate of about half a mile an hour. This current were observed to exist both on the North and on the South sides of the island; and they were disposed to think it would be found to prevail for the most part of the year.

The greatest rise and fall of the tide are 6 feet. The currents set strongly in and out of the passages, until the water rises above the level of the reefs, when it flows over in all directions, and its force is much decreased.—(Vol. iii. p. 322.)

The current seems to set here in a contrary direction from what might at first be assumed. It is remarkable that during the examination of the S.E. islands of the Feejee group, in all the trials of the current, the American surveyors found it setting to the *eastward* about half a mile an hour, varying in direction from E.N.E.

to E.S.E. This fact is confirmed by the information obtained from the natives, that canoes which are wrecked to westward are always drifted upon these islands.*

However, whether this remark holds good throughout the year, and in all portions of the group, we have scarcely the means of judging. D'Urville found it run to the S.S.W. 30 miles per day off Kandabou, and to the S.W. near N'hao; but between Vatu-Lele and Viti-Levu it runs strongly to the S.E. Perhaps the variations may not extend far beyond the islands, and may have been caused by the unusually bad weather that the *Astrolabe* had when here.†

The positions of the islands of the Feejee group, according to Wilkes's survey, depend upon the meridian of Observatory Point (on which he erected a pile of stones as a mark for the harbour) of Levuka Harbour in Ovalau. This, from moon culminating stars, is in lon. $178^{\circ} 52' 40'' 78''$ E., and the lat., from circum-meridian observations of sun and stars, is $17^{\circ} 40' 46'' 79''$ S. The rest were carefully fixed by meridian distances from this, a chain having been carried round.

In the ensuing particular description of the islands composing the archipelago, we begin, as in former cases, with the south-easternmost, proceeding in succession to the westward.

VATOA or TURTLE ISLAND is the south-easternmost of the group. It was discovered by Cook in 1773. In itself it is unimportant, except in its position, as being the weathermost of the archipelago, and its low and dangerous character.

These points have not been diminished in importance by a singular mistake which has crept into the survey by the United States' Expedition. On May 5, 1840, the *Vincennes* "had a sight of Turtle Island, and determined it to be in lat. $19^{\circ} 48'$ S., lon. $178^{\circ} 33'$ W. It has the appearance of a small rounded knoll."‡ This would seem to be circumstantial, and is further confirmed by a foot-note on the same page. In a subsequent passage (vol. iii. p. 379) the United States' ship *Porpoise* is said to have determined it to be in lat. $19^{\circ} 50'$ S., lon. $178^{\circ} 37' 45''$ W. "It was found to be 3 miles long by $1\frac{1}{2}$ miles wide. The reef extends all around the island, and is from $1\frac{1}{2}$ to 2 miles wide."

This singular variation in longitude from that assigned to it by the great discoverer, Cook ($178^{\circ} 0'$ W.), or $37'$ in error, is startling, because the accuracy of Cook in this instance had been confirmed by other navigators. The following by Capt. Worth, R.N., may explain it:—

"I had procured from the master of the whale-ship at Apia Capt. Wilkes's (of the American Exploring Expedition) works, with his charts and plans of the Feejee Islands, in which it stated that Turtle Island had been surveyed, and the reef (on which an American whale-ship had been lost) examined. I cannot, however, conceive this to be the case, or, if so, some great error must exist in the publication, for not only is there no mention made of the detached and dangerous reef, but the position of the island itself is placed very erroneously, and which is the more necessary to correct from its being the S.E. point of this intricate group, and which vessels from the eastward would usually round in entering it. We made the centre of the island to be in lat. $19^{\circ} 47'$ S., and lon. $178^{\circ} 8'$ W., 29

* Wilkes, vol. iii. p. 173.

† D'Urville, vol. iv. pp. 432, 442, 445, &c.

‡ Narrative of the United States' Exploring Expedition, vol. iii. pp. 45, 379.

miles to the eastward of Wilkes, who places it in lat. $19^{\circ} 50' S.$, lon. $178^{\circ} 37' W.$, with a reef extending 5 or 6 miles in a S.W. direction, and a large oval coral patch detached from it, lying N. and S., 8 or 9 miles in length, both of which were breaking heavily. The island is apparently about 6 miles in length."—(Capt. Worth, H.M.S. *Calypso*, 1848.)*

ONGEA.—The S.E. island of the main group is called, according to D'Urville *Ong-Hea*, or Ongea by Wilkes. There are, in fact, two islands enclosed in the same reef, called Ongea-Levu and Ongea-Riki (*Ong-Hea-Lebou* and *Ong-Hea-Riki*). There is a good entrance on the N.W. side of the reef, and a harbour, to which the name of Port Refuge was given by Wilkes; but there is little or no inducement to enter it, for the islands are barren, and no water is to be found. A few wretched inhabitants are on them.

Three miles to the southward and eastward of Ongea is a dangerous reef and sand-bank, called Nugu Ongea (*Nougou Chonguia*, D'Urville).

BOULANG-HA (D'Urville), FULANGA (Wilkes), or *Laquaba* (of Arrow-smith), lies to the West of Ongea. It is a fine island, composed of volcanic materials, its West bluff being 150 feet high. This is one of the group on which fine timber grows, and is resorted to by the Vavao and Friendly Islanders for building their canoes. It is surrounded by the usual coral reef, and contains a central basin, the entrance to which is on the North side, through the reef, suitable for small vessels. The tide rushes strongly in and out of this basin. There are some islets and reefs in the basin, composed of scoriaceous volcanic materials, and these afford some biche-de-mar. There is a village at the head of the bay, and another on the S.E. part of the island, accessible only by canoes. Good water, fruit, vegetables, and poultry, can be obtained; the beach abounds with very good oysters. The natives, about 150 in number, were friendly, and under the care of a Tongese missionary in 1840.

MARAMBO (*MORAMBA*, Wilkes) is a small island, half a mile in diameter, 8 miles N.W. of Fulanga. It is well wooded and surrounded by a reef, but useless to vessels.

KAMBARA (the *APPALLO* of former charts) is next N.W. of Marambo. It is of a rectangular form, about $3\frac{1}{2}$ miles long and 2 miles wide, and is the westernmost of the eastern group. It is fertile and well wooded; its timber is esteemed above that of all the other islands of the group for canoe building, and cocoa-nut groves abound along its shores. The island is not entirely surrounded by the reef, which is wanting on the N.W. side. On examination it proved to have no anchorage for large vessels, but small ones and boats may find protection. This island may be known by a remarkable bell-shaped peak on its N.W. side, which is a good landmark. It is covered with verdure, and is 350 feet high.

ENKABA, or *FOOCAFFA*, lies N.E. of the foregoing. It is 2 miles long by 1 mile wide; is inhabited, well wooded, and has a breach in the reef, but no harbour.

TABOUNE-SIKI (*TUBANAIELLI* of Wilkes) is a small uninhabited island, 13 miles N.W. of Enkaba.

Between this range of islands and those to the eastward is the *Boulang-Ha*

* See Nautical Magazine, December, 1849, p. 603.

Channel, which appears to be clear. Its South entrance is between Ongea and Boulang-Ha.

ANG-HASA (ANGASA of Wilkes), 8 miles North of Ong-Hea, the Table Island of Wilson,* is easily distinguished, and is remarkable for long regular ridges that extend through the centre, and appear as if artificially formed. The island, with three smaller ones, is enclosed in one extensive reef along with several small uninhabited islets. To the eastward and N.E. of Ong-Hea and Ang-Hasa are several detached reefs extending $5\frac{1}{2}$ miles off the island.

NAMUKU, the *Neat's Tongue* of Wilson, its discoverer, has a very extensive reef surrounding it, and offers no anchorage. There are but few natives on it.

To the North of this are two small islands, *Komo-Levu* and *Komo-Riki*, enclosed in the same reef, through which there is a passage on the N.E. side. There are but few natives.

HOLO-ROUA (D'Urville), the *Ularua* or *Olenea* of Wilkes, lies westward of Komo, and is a small desolate island, encompassed with an extensive reef. These islands were first seen by Wilson.

MOZE', or МОТНА (Wilkes), lies to the eastward of Komo. It is one of the most picturesque islands of the group, with an undulating surface; its hills are more free from wood than those to the southward. It is about 2 miles in diameter, and is surrounded by an extensive reef, through which there is only a boat entrance on the North shore. *Karoni*, which is Wilson's *Skerries*, is of small size, and lies within the same reef, towards its southern end. Mozé forms the South side of what Wilkes terms the *Oneata Channel*; it is a good landmark to run for in making the group, being high and surrounded with sloping sides. Its soil is rich, and its population a few natives. There are three detached reefs to the eastward and within a few miles of it, among which we may look for the *Providence Reef* of Capt. Bligh.

The three Islands of Mozé, Komo, and Holo-Roua, compose the *Danger Isles* of Wilson.

ONEATA was seen by Wilson, and lies North of Mozé; it forms the northern side of the Oneata Channel. It is of good height, and may readily be known by Observatory Isle to the N.E., 250 feet in height, with three lofty trees on its apex. The reef around Oneata is also extensive; it has two good entrances on the N.E. side, and three on the West.

There is excellent anchorage under *Observatory Isle*, near a settlement on the N.E. side of the island. A second anchorage is to be found off the West side of the island, near a large sandy bay.† No water is to be had here; but there is abundance of fruit, vegetables, and poultry. The natives are sharp traders. The population is 200, one-half of whom are Christians, under the care of two Tahitian missionaries, apparently excellent men, who had been there for twenty years in 1840. The village is on the South side of the island, in a grove of cocoa-nut trees, much troubled with mosquitoes. The southern side of the island is a mass of lava but little decomposed.

* Voyage of the *Duff*, p. 281.

† Capt. Bethune says that he tried the anchorage at Oneata, and found it unsafe for 17 feet.

Between Oneata and Laguemba are the two *Echouas* (or *Aiva Islands* of Wilkes), high and low. They are both uninhabited, and are surrounded by an extensive reef, with the exception of a large opening on the N.E. side, which affords anchorage, exposed, however, to N.E. winds.

LAGUEMBA, LAKEMBA of Wilkes (D'Urville says, improperly, *Atakimbo*), is the largest island of the eastern group. Its form is nearly round, with an extensive encircling reef. The town is on the South side, and contains about two-thirds of the population (1,000) of the island. This is the principal locality of the race Capt. Wilkes calls Levukians, the first settlers of Ambau. The Tongese at Laguemba give them a bad character, faithless, and at times addicted to piracy. In other parts of the group, however, they are considered a useful class, by means of which the trade between the different islands is carried on, so that their bad qualities are only comparative.

The highest peak of Laguemba, called *Kendi-kendi*, was found to be 714 feet.

The survey of Laguemba gave its length 5 miles East and West by 3 miles North and South. The reef extends 6 miles from the island in an E.N.E. direction; in it there are two openings, one on the S.E. side sufficient for large vessels, but dangerous, from the coral patches which stud it, and one opposite to the town on the South or S.W. side. Into the latter a vessel of one or two hundred tons may enter; but after getting in the space is very confined, and it would be necessary to moor head and stern. M. Lottin, who entered it with D'Urville's people, thought that the *Astrolabe* might have entered in fine weather upon an emergency. —(Vol. iv. p. 695.)

Laguemba was found, like the rest of this group, to be of volcanic formation. The soil is similar to that of Vanua, composed of a dark-red loam. The island, in point of fertility, will compare with any of the others, and exceeds all those of the S.E. in size and productiveness. It has rich valleys, or rather ravines, gradually rising and contracting until they reach the hills. Extensive groves of cocoa-nuts cover its shores and low lands, and add much to its beauty.

To the eastward of Laguemba is the great Argo Reef. Its native name is Bocatatanoa, and it is one of the most extensive and dangerous in the group. Its English name is derived from the loss of the English brig *Argo*, on its S.E. end, in the year 1806. Besides this, another vessel, named the *Harriet*, is said to have been lost here. All hands from one of these vessels were killed, while only a few escaped from the other.*

NEAOU (D'Urville), or NAI AU (Wilkes), the Oedida of the charts, is a high island, and rises in perpendicular cliffs from the sea to the height of 275 feet.† It has only a small reef attached to it on one side, the other side being free. It offers no facilities for the visits of vessels. Neaou contains a population of 200 inhabitants, who are perched upon inaccessible peaks, in order to protect themselves from depredations.

* "It must be borne in mind that any canoe or vessel, whether native or foreign, when driven on shore, is accounted an offering to the gods. All that it contains is considered as belonging to the chief of the district where the incident happens, and the people on board are at once sacrificed."—*Capt. Wilkes*, vol. iii. p. 244.

† Capt. Wilkes supposes this to be the Cap Island of the charts, but apparently without reason; it more probably belongs to Azata, as mentioned hereafter.

TABUTHA is 30 miles North of Lagueмба. It has a remarkable peak, which rises on its N.W. end. A reef surrounds it, in which there are two boat entrances on the N.W. and S.W. sides. There are on it about 90 inhabitants; it has no water except from wells. There are two small reefs, called Mamouko, to the S.W. of it, which can be closely approached, and have a passage between them. They are 3 miles from the islands, S.S.W. (*true*).

To the eastward of Tabutha lies the small island of Aro. This is a pretty island, and has three reefs in its neighbourhood, one (*Gordon Reef*) lying N.E. 7 miles; another, E. $\frac{1}{2}$ S. $2\frac{1}{2}$ miles; the third, S. $\frac{1}{2}$ E. $2\frac{1}{2}$ miles. This small island is only inhabited during the turtle season, which begins in October and ends in February.

DZIZIA (D'Urville), CHICHIA (Wilkes), the Favourite Island of the charts, lies 20 miles to the N.W. of Neaou. It is nearly circular, is 3 miles in diameter, and a shore reef extends around it, with no opening but for canoes. Some of its points are 300 feet high. It is in places thickly wooded, and has about 300 inhabitants. There is a small reef (Kneass Reef) to the S.W., with a passage between it and the island. The soil is rich, and everything is produced in abundance. Extensive cocoa-nut groves clothe its low points.

MANG-HO, or MANGO (Wilkes), is another small island, 18 miles to the N.N.E. of Dzizia. It is remarkable for an open space near its centre, which appears as if it had been artificially cleared. It is surrounded by a reef, which has a break on the N.W. side, but it affords no protection for vessels. The southern part of the reef extends off about a mile, and has two small islets in it. It affords no shelter, and there is no water except from wells. Its shape is oval; its longest diameter is 3 miles, and its shortest 2 miles. There is a distinct reef (Frosty Reef), which lies N.W. by N. 4 miles from it. Mang-Ho is the Cox Island of Wilson's chart.

Vikai is 6 miles from Tabutha. It is a low islet, with an extensive reef lying on its N.W. side, and is resorted to during the turtle season.

Katafanga is also a small isle, inhabited only during the turtle season. Its reef is much more extensive, being $4\frac{1}{2}$ miles from East to West, and has a small opening, which would admit a vessel drawing 10 feet of water were it not impeded by some dangerous coral knolls. There are huts on its N.E. point, and abundance of sugar-cane, fruit, and vegetables, may be procured.

Both the last-named islands are volcanic. The latter island is 150 feet in height.

The Reef of Malevuvu is $2\frac{1}{2}$ miles long, and is awash, with the sea breaking over it. It is 7 miles North by East from Katafanga.

The group called the *Exploring Islands* by the American Expedition would be better named WILSON ISLANDS, from their discoverer, Capt. Wilson, in the *Duff*, September 12, 1797. They are very well laid down in his chart, but not the slightest notice is taken of his claim by the American officers. They lie to the northward of the foregoing.

The islands, seven in number, are all of considerable size; VANUA-VALAVO, or *Sir Charles Middleton's Island* (Wilson), the largest of them, is of a serpentine shape, and 14 miles in length. Each island has its own separate reef around its shore, and the whole are enclosed in an extensive reef, somewhat in the shape of a

triangle, whose sides are 24 miles in length. The large island is in no place more than 2 miles in width; it is situated along the western side of the triangle, and contains many fine bays and safe anchorages. The other islands are called by the natives *Munia*, *Susui*, *Malatta*, *Ticumbia*, and *Osubu*. The surrounding reef was entered from its S.E. side.

MUNIA, or *Hadow's Island*, is the southernmost of the group. The anchorage of the U.S. vessel *Porpoise*, named *Discovery Harbour*, is described as a good one, in $8\frac{1}{2}$ fathoms, fine sand. The highest peak of Munia, called *Telanicolo*, was estimated to be 1,054 feet high; it is composed of volcanic masses, with high, craggy, overhanging cliffs. The island contains about eighty inhabitants, and the settlement is on the western side, where water may be obtained.

TICUMBIA, *Van Shirnding's Island* of Wilson, lies 5 miles to the N.E. of Munia, to which it bears a close resemblance, but is much smaller. It has about seventy inhabitants, and affords but little water.

SUSUI, or *D. Scott's Island*, lies between Munia and Vanua-valavo. It is divided into three parts, of which the easternmost is low, and covered with thick shrubbery and groves of cocoa-nut trees; the western portion rises in broken basaltic peaks, several hundred feet high, and is thickly wooded. On this island are several villages, and the number of inhabitants is 150. The ground is much better cultivated than is usual, the patches of taro and yams being kept remarkably neat. Good water may be obtained on the N.W. side, running from the cliff. On this side, also, is a beautiful harbour, secure from all winds, whence an extensive valley runs back, thickly covered with bananas, cocoa-nuts, &c., with a small stream running through it. Inland, fossil shells were lying about in every direction, and were seen exposed in the strata on the hill sides. Sugar-cane was growing in great perfection. The southern side of the island is in close proximity to the reef that surrounds the cluster.

MALATTA is the next island to Susui; it is much smaller, and separated by a narrow passage from Vanua-valavo.

The southern part of **VANUA-VALAVO**, or *Sir Charles Middleton's Island*, is *Lomo-Lomo*.* It has a good harbour on its East side, opposite Susui, protected by a small islet. On the West side of the island are two openings in the reef, a spacious harbour, and a large stream of water. There is a large village at the head of the bay. *Mount Totten*, one of the peaks, was estimated at 664 feet high. The island is calculated to contain 1,000 inhabitants.

AVIA, or *Curling's Island*, is a small island to the N.E. of Vanua-valavo. It has a few natives residing on it; and 4 miles East of it is a small cluster called *Osubu*, or the *Three Brothers*.

To the eastward of the reef which surrounds the islands is a detached reef lying parallel to the principal. The southern end of this is 2 miles distant from the other. It has a small sand-bank on its South side, and trends N.E. and S.W. for 4 miles; there is also on it a black block of rock.

WILSON ISLANDS are well situated for the resort of vessels; the anchorages are

* In the American chart, the *northern* part is thus distinguished. There are some other discrepancies in the account of this group, which we have not the means of reconciling.

safe, and easily reached. They afford an abundance of fruit and vegetables. There are five openings in the large reef, two at the East end, two on the West, and one on the North side, all safe. Vessels wishing to anchor on the western side must enter one of the western passages, as the near approach of Vanua-valavo to the large reef does not admit of a passage for vessels between them.

KANAZEA (D'Urville), KANATHIA (Wilkes), to the West of Vanua-valavo, with its many verdant and fertile hills, is a remarkably pretty island. It is the *Sim's Island* of Wilson's chart. Its central peak is sharp and lofty, somewhat resembling a lookout house, formed of basaltic columns. It is surrounded by a reef with boat entrances, and has on the North a break. The reef extends $4\frac{1}{2}$ miles on the N.E. side, and to within 2 miles of that of Vanua-valavo. Kanazea is 3 miles long from North to South, by $2\frac{1}{2}$ miles from East to West; it is 5 miles West of Vanua-valavo. The passage between them is clear, and the reefs of both islands are visible at the same time. A detached reef, *Frost's Reef*, lies off the S.E. end, 5 miles distant. Kanazea has about 300 inhabitants.

MALINA, the *Scars* of Wilson, lies 7 miles North of Kanazea; it is low, small, and has little herbage. It has an extensive reef surrounding it.

BATOU-BARA (D'Urville), VATU-RERA (Wilkes), lies 17 miles West of Mang-Ho. It is small in extent, and its centre is surmounted by a very high rock of a singular structure, and as even as a table on its summit. This islet, which may be seen a long way off in all directions, is the best mark in this part of the Feejee Archipelago.* This would thus appear to be the *Hat Island* of the chart, and we may also assume that it is identical with *Haweis Island*, and that the *two* groups to which these names belong are in reality but *one*. It has an extensive reef, quite desolate.

The NOUGOU-TOLOU (the "Three Sands" of D'Urville), or NUGATOBÉ ISLETS (of Wilkes), are three in number, small, and covered with trees; the two westernmost are enclosed in the same reef.

AZATA (D'Urville), YTHATA (Wilkes), probably the *Hamilton Island* of the charts, and the *Cap Island* also, is a high island, with a bell-shaped peak, lying North of Batou-Bara; it is surrounded by an extensive reef. There are two low islets lying East of it, connected by a reef, in which is a small canoe passage at high water. Azata has extensive cocoa-nut groves along its shores; it is one of the islands that form the southern boundary of the Nanuku Passage. It has about twenty inhabitants.

NEÏTA-OUNBA (D'Urville), NAITAMBA (Wilkes), was discovered by Wilson, who calls it *Direction Island*. It is 17 miles to the N.E. of Azata, is high and rugged; it is of a circular form, $1\frac{1}{2}$ miles in diameter. The reef does not extend beyond half a mile from it, and has no openings. It has few inhabitants.

OKIMBO, to the East of Neïta-Oumba, is made up of three small islets enclosed in the same reef, 4 miles East and West, by 3 miles North and South, and 7 miles North of the N.W. point of Vanua-valavo. The detached reefs are from 1 to 4 miles in length; they are awash and dangerous. Okimbo is desolate, and affords nothing but turtles in the season, and some biche-de-mar.

* D'Urville, vol. iv. part ii. p. 416.

YALANGALALA, which is most likely the *Low Island* of Wilson, is the northernmost of the eastern group. It has an extensive reef, and is uninhabited.

The Reef to the East of Yalangalala has an extensive sand-bank on it. The Island of Vuna, 50 miles to the westward, is plainly visible from it. Capt. Ringgold examined the space for 30 or 40 miles to the eastward, but no other dangers were found. Capt. Wilkes has named this the Duff Reef, but a very casual glance will show this to be erroneous, it being more than 30 miles to the N.N.W.

There is also a large bank of coral, probably of several miles in extent, on which 11 fathoms were found. There is plenty of water on most parts of it for any class of ships, though it would be well to avoid it, as there may be some coral knolls that might bring a ship up.

NANUKU PASSAGE is formed on the South by Yalangalala and Veleraru, the Island of NANUKU, the *Warner Island* of Wilson, and its reef forming the northern side. This passage between the islands is 10 miles long; the course through is S.W. The islands to the North of this passage are small and low, and surrounded by very large and extensive reefs. The most northern of these are *Korotuna* and *Nukulevu*, both of which are low, covered with trees, fertile, and have many inhabitants. The *Scylla* and *Charybdis* Reefs of Wilson are identical.

NUKUMANU (Wilson's *Sandy Island*) and NUKUMBASANGA lie to the southward of these; they are almost united by reefs and sunken patches of rock, which extend to the Nougou Reef, and round to Laoudzala and Ongomea.

It is on this part that we must look for *Duff Reef*, where that vessel providentially escaped destruction on the evening of September 13, 1797. Her track, laid down on Wilkes's chart, places her upon one of the reefs named otherwise in it, and appears very evident, therefore it is unaccountable that it should be placed by those surveyors in a situation where none of the bearings or objects will coincide with Wilson's simple and plain narrative.* Upon the chart accompanying this narrative is placed an important caution, which it is as well here to copy:—"Upon these small reefs there is scarce a ruffle of the sea to apprise of the danger."

Too much precaution on the part of mariners cannot be used in approaching this part of the group. Several times during the survey, the U.S. brig *Porpoise* was in great danger. The currents and tides are irregular, and much governed by the winds, and at times are found running with great velocity through the various and contracted passages.

The two last-named islands are included in the group which was named by Capt. Wilkes the Ringgold Isles, after the Lieutenant-Commandant of the *Porpoise*, who surveyed this portion of the archipelago, to the exclusion of the name bestowed on them by their discoverer, Wilson, or that given by D'Urville, *Janoudza Islets*.

The highest of the "CLUSTERS" of Wilson, the western part of this group, was named Budd Island by Wilkes. It is composed of volcanic scorice and large blocks of lava, rising to the height of 800 feet, and has almost a perfect crater in its centre. The outside or rim of this crater forms the island, and is very narrow

* See Voyage of the *Duff*, pp. 264-5.

at the top; its inner side is quite perpendicular, while its outer side is generally inclined at an angle of 50° or 60° , although in places it is almost perpendicular. It has some large trees near its base. The other islands in its neighbourhood are uninhabited; they are barren rocks, and too dangerous to be approached by a vessel, the reefs extending as far as the eye can reach.

ZIGOMBIA is the CHICOBEA of Wilkes, and is the most northern island of the archipelago, and was discovered by Wilson in September, 1797; he called it *Farewell Island*. It is of an oval shape, and is formed by two hummocks of considerable elevation. It is 3 miles long, S.E. and N.W., and $1\frac{1}{2}$ miles wide; it is surrounded by a shore reef, which has no openings except for boats, and offers nothing to tempt a vessel to land.

TABE-OUNI (D'Urville), or VUNA, according to Wilkes, is one of the principal islands of the group. Its length is 25 miles, and its breadth 5 miles. It rises gradually to a central ridge, the height of which, by several measurements, was found to be 2,052 feet. The summit is generally covered with clouds. From its gradual rise, and its surface being smoother, it is susceptible of a much higher state of cultivation than the other islands; the soil is a rich, reddish loam, and it appears to be considered as the most fruitful of the islands.

The inhabitants are estimated by Capt. Wilkes to be 7,000 in number, and are the most savage of all the savage people who disfigure this beautiful archipelago. Cannibalism prevails here to a greater extent than anywhere else, and the details given, from the reports of the resident missionaries, are so revolting as to be scarcely credible. However, they stand as records degrading to our nature.

The town of *Somu-Somu* is the principal town of the island, and is also one of the chief towns of the Feejee group, though it acknowledges no sort of traditional subjection to Ambau. It stands on the N.W. side of the island, and contains about two hundred houses, built in a straggling manner. It is partly built below a bluff, which affords a very safe retreat and strong defence to its inhabitants, and is divided therefore into a lower and upper town. The upper town is so much concealed by trees and bushes growing on the bluff on which it stands, that one might be at *Somu-Somu* many times without noticing it. The approach to it is through a narrow pass, from which there is a beautiful view. There are a trench and a palisade around a great portion of it.

There is anchorage off the town, and off it also lies *Corolib* or *Goat Island*. The Island of Vuna is separated by a strait 5 miles wide in its narrowest part, which has been named after the town. The *tides* are strong; the *ebb* runs to the northward through it, and the flood to the southward. There is a navigable passage between Vuna and Corolib, but it is made somewhat intricate by sunken coral knolls and banks of sand. These shoals extend 2 miles beyond the island into the strait.

On the opposite side of Tabé-Ouni is the strait which was named by D'Urville Tasman Strait, between that island and Ongomea. Though contracted, it affords a safe passage. There is a fine harbour, called *Tubou* by Wilkes, after the native pilot on the Tabé-Ouni side. It is well protected from North winds, and is formed by an extensive reef and sand-bank.

TASMAN STRAIT (which was named so by D'Urville thirteen years *before* Wilkes's visit) should not be attempted except in favourable weather, and the best time is during the morning hours, when the sun is to the East of the meridian. The currents are strong and calms are frequent under the high lands of Ongomea. There are also some coral patches, requiring a careful lookout.

The island on its East side, ONGOMEA of D'Urville, and the KAMIA of Wilkes, is the same as *Ross's Island* of Wilson, its discoverer. The island adjoining it on the East is *Laoudzala*, the *Louthalu* of Wilkes; they are both surrounded by reefs, which form a narrow passage on the East between it and those extending West from Nougou Laoudzala.

VANUA-LEBOU, or VANUA-LEVU, "Great Land," is the great northern island of the group. It has been sometimes named *Tacanova*, or *Tackanova*, or *Takaou-Nové*, but this is only the name of one of its large towns, *Dagonrobé* in the Tonga dialect. *Paou*, or *Pao*, or *Paw*, or *Pau*,* by which it has also been known, is the name of the small island at the East end of Viti-Levu, which claims so much authority over the archipelago, or perhaps from the native name of Sandalwood Bay at its West end. All these names are unknown in the island with the exception of the first.† The name of Sandalwood Island is now scarcely applicable, inasmuch as the small district at its West extreme, which afforded this wood, has been exhausted. The following account of it is chiefly derived from the American survey.

Vanua-Levu in its greatest length is about 96 miles from E.S.E. to W.N.W., and its average breadth may be about 25 miles.

Its N.E. extremity is *Unda Point*, the termination of a long, narrow peninsula, some portion of which was seen by Wilson in the *Duff*, and called by him *Edward's Island*. The southern side of this forms the northern limit of a very extensive bay, or rather gulf, *Natava Bay*. It affords no inducements for commerce or for vessels to venture in: there is no bottom except with a great length of line, and anchorage very near the shore. The land is much broken into volcanic peaks.

Rambé, which is Wilson's *Gillet's Island*, forms the S.E. point of *Natava Bay*. It is lofty and much broken; well wooded, with many deep bights, in one of which, on its S.E. side, there is anchorage. There is a large settlement on its N.W. side. Between it and Vanua-Levu there is a passage, though much studded with reefs.

Kea Island is Wilson's *Tate's Island*, and lies to the S.W. of *Rambé*. On its N.W. side is a harbour, named *Port Safety* by the American surveyors, from the shelter it afforded their vessel in a gale. It is of a singular form, and on it Dr. Holmes, a naturalist, was nearly lost, from missing his way. The few inhabitants have abundance of provisions, pigs, fowls (said to be wild in the woods), yams, cocoa-nuts, &c.

After passing round the S.E. point of Vanua-Levu, near which is a town called *Tuconreva*, there is an opening in the surrounding reef called *Baino Harbour*.

* Mariner.

† See D'Urville, vol. iv. part ii. pp. 426, 707, 710; and Krusenstern, vol. i. p. 233.

Four miles farther to leeward is *Fawn Harbour*, so named from an American brig wrecked here. Farther West, the next opening is near the small islet of *Rativa*, but it offers little accommodation for any class of vessels. It is opposite the town of *Nabouni*. Two miles beyond this the reef joins the shore.

SAVU-SAVU BAY is the principal opening on the South side of Vanua-Levu. It is a fine sheet of deep water, 10 miles East and West, and surrounded by very high and broken land, rising in many places into lofty, needle-shaped peaks, and protected by the extensive reef reaching from Savu-Savu Point on the East to Kombelau on the West, excepting a large opening, about a mile in width, 2 miles from Savu-Savu Point. The bay may be known by a remarkable saddle-shaped peak lying just behind it. Some of the peaks reach the altitude of 4,000 feet.

The projection of land forming Savu-Savu point is much lower than that on the other sides of the bay, and in the S.E. corner of the latter are the hot springs of *Waicama*.

These are five in number, and are at some distance from the beach. A cold stream flows by them, but the springs have a temperature of from 200° to 210°. The springs are very copious, covering a considerable extent, and are used by the natives at times to cook their food. Their vicinity was formerly populous, as a strong fortress near indicates; but the nearest town is Savu-Savu, 2 miles off.

Off Kombelau Point is an island of the name; and off this there is a reef, 5 miles in length, and beyond and between it and the Great Passage Island Reef there is a passage, supposed to be full of shoals, but through which the surveying ship was taken. Eleven miles S.S.E. of Kombelau Point is *Nemena* or *Direction Island*. It is surrounded in every direction by outlying reefs, which, however, afford a narrow passage through them. The island forms two high, regular hills, covered with dense foliage. It is not inhabited, being only occasionally resorted to by the natives. Beyond *Buia Point*, the S.W. point of Vanua-Levu, the passage becomes still more intricate; and opposite *Rabe-Rabe Island* it is quite narrow, though there is sufficient water for any vessel. However, the *Peacock* was taken easily to Lecumba Point, the S.E. point of Sandalwood Bay.

Capt. Worth's observations on this coast, made in H.M.S. *Calypso*, on 28th of July, 1848, are as follow:—

“Having passed through the sea reef by the Mokungai Passage, we again entered it through the Passage of Buia, which is nearly opposite Sua Lib; but it becoming dark, I anchored for the night under shelter of the sea reef, and, on the following morning, anchored off Sua Lib, at 8^h 30', A.M., half a mile distant.

“This anchorage is by no means a good or a safe one; for, although in some measure sheltered by the sea surf, it is too distant (6 miles) to afford it effectually; and when blowing strong either along shore or upon it, a high sea gets up. Trading vessels usually prefer anchoring off Ragi-Ragi, or Cocoa-nut Point, which is about 6 miles farther to the westward. Within the sea reef the current is often very strong, and is principally governed by the strength of the wind and the force of the sea breaking over. Its rise and fall are 5 feet, which is about the average amongst all these islands.

“On the 1st of July I weighed at 10^h A.M., with a view of proceeding to Sandalwood Bay, which is situated on the S.W. end of the large island (Vanua-

Levu), and 20 miles to the N.W. of Sua Lib; the wind being light and variable from the southward and eastward, and the sun getting too far to the westward to see the shoals, I anchored, at 2^h 50' P.M., off Cocoa-nut Point, and weighed the next day at 11^h A.M., and reached Sandalwood Bay at 3^h P.M., anchoring in 6½ fathoms, Lecumba Point W. ¼ S., and Dimba-Dimba S. ¼ W.; off shore, from the bottom of the bay, about 1½ miles."

MBUA, or *Sandalwood Bay*, though much filled with large reefs, offers ample space for anchorage. The holding ground is excellent and the water not too deep. The bay is of the figure of a large segment of a circle, 6 miles in diameter, and is formed by Lecumba Point on the East, and that of *Dimba-Dimba* on the West. The land immediately surrounding it is low, but a few miles back it rises in high and picturesque peaks. That of *Corobato* is distinguished from the Viti-Levu shore, and is 2,000 feet high. The shores of the bay are lined with mangroves, and have, generally, extensive mud flats. There are few facilities here for obtaining either wood or water, as the anchorage is a long distance from the shore. Several small streams enter the bay in its upper part, flowing from some distance in the interior. This was the principal place where the sandal-wood was formerly obtained, and from which the island was best known; but it has been for some years exhausted, and it is from here that very large quantities have been shipped.

Dimba-Dimba Point, the West extreme of Sandalwood Bay, is considered by the natives as sacred ground, and is strictly kept from any kind of disturbance. It is a most beautiful spot; the trees flourish on it in contrast to much of the surrounding country.

"As a good anchorage, Sandalwood Bay is very superior to any in the Feejee group; indeed it can hardly be surpassed anywhere: it is spacious, and a great portion of it clear from shoals, with a mud bottom, and a draught of water varying from 6 to 8½ fathoms, and is perfectly sheltered on three sides by land, and on the fourth, or sea-side, by the reefs. Water can only be procured by sending some distance, and is not of good quality. Stock is to be obtained as at all other anchorages, but not so abundantly, there being but few inhabitants on this part of the island. The passage from Sua Lib to Sandalwood Bay, from the numerous reefs and patches, is confined and intricate till off Cocoa-nut Point, when it becomes clearer; the shoals and reefs may be distinctly seen, provided the caution is used of having a clear and bright sun behind you, and steering from the mast-head. We found the tide from 1½ to 2 knots, the flood setting to the westward, and the ebb to the eastward.

"On the 4th of July, 1848, at 1^h P.M., I weighed from Sandalwood Bay, on my return to Sua Lib, and after a tedious passage, having frequently to anchor, in consequence of light and variable winds at times, whilst at others strong winds from the eastward, and a current which obliged us to beat nearly the whole way, I reached it on the 6th, at 3^h. The pilot (an Englishman, whom I engaged on first coming to the Feejees) appeared well acquainted with this part of the group, as he proved, indeed, to be with all we had hitherto visited."—(Capt. Worth, R.N., July, 1848.)

YENDUA ISLAND lies to the West of Sandalwood Bay, the whole interval

between being foul ground from coral patches. Yendua may be said to be divided into two islands, having a boat passage between them, and bottom composed of a black volcanic conglomerate. *Porpoise Harbour* lies to the southward. It is very pretty, and its form is that of a large segment of a circle, $1\frac{1}{2}$ miles deep and 1 mile wide. It is open to the S.E., but protected by a double reef. The entrance is on the East side. The island is about 12 miles in circumference.

North of Dimba-Dimba Point is a high peak, which has a town perched on its very top. Beyond this is *Ruke-Ruke Bay*, which has a reef across its mouth, leaving only a narrow ship channel into it. *Ivaca Peak*, on the North side, is a high and bold bluff, 1,563 feet high. On its top is also a town. The *Island of Anganga* is immediately opposite to this peak. To the passage between them the American surveyors gave the name of *Monkey-face Passage*, in consequence of one of the rocks having a remarkable resemblance to that animal. A little beyond this is the rock where Capt. Dillon's adventures occurred.* *Anganga Island* is high and very much broken; it is not inhabited, and offers nothing but turtles in the season.

Naloe Bay is a wide opening, protected on the North by two or three small islets, one of which, *Tavea*, has been bought by a company of native fishermen; and on another a large biche-de-mar house was erected by Capt. Eagleston, of the *Leonidas*, who afforded the expedition much useful information relative to the group.† The town of Votua lies about a mile from the shore. The natives, from being more accustomed to visitors, procured ample supplies of wood and water for the American ships.

Off Anganga Island the outer edge of the Great Sea Reef is 16 miles distant. Its direction is about East and West at this point, and it takes a somewhat more southerly direction toward Round Island, hereafter described. There are several small openings through its outer edge, necessarily very dangerous, if practicable, and when within there are many sunken coral patches.

The islands on the coast, from Naloe Bay to Muthuata, a distance of 25 miles, are for the most part low, and covered with tiri (mangrove) bushes. There is one within a few miles of Muthuata, called *Nucumbati*, which is remarkable in shape as well as picturesque in appearance. On this is a deserted town of about sixty houses, situated in a beautiful grove of cocoa-nut trees.

The town of *Mhattuua* consists of about 100 houses, built closely together, and is situated in an open valley close to high-water mark. It is very much exposed, and quite defenceless; it has but few trees about it, and is one of the best built towns in the Feejees. The style of building resembles that of Rewa. Immediately off the town lies the *Island of Muthuata*. This island not only protects the harbour from the North wind, but adds much to its beauty, by its high and luxuriant appearance. It is little more than a mile in length, and appears to have been a long time the burial-place of both chiefs and common people. Twelve miles North of it is *Kie Island*, which is included in the barrier reef. The land on this part of the coast of Vanua-Levu rises abruptly from the water in volcanic peaks, to the height of 2,000 feet and upwards.

* Narrative of a Voyage in Search of La Pérouse, by the Chev. Dillon.

† An account of the biche-de-mar fishery is given at the end of the volume.

At 16 miles eastward is the Island of *Mali*, which is thinly inhabited. Opposite to it is the *Mali Passage*, through the outer reef; and at 13 miles still farther is the last opening on the North coast through the outer reef to the ship channel within it. It is called the *Sau-Sau Passage*; it occurs at 33 miles from Unda Point. There is, however, one tolerably good harbour in the interval, called *Tibethe*, and there are several towns around the bay.

The North shore of Vanua-Levu appears to be well peopled. The total population of the island, as gathered by D'Urville, is 10,000. Wilkes makes it nearly five times this number with the surrounding islands, assigning 15,000 to the Muthuata district alone. These calculations must be very desultory. Of the interior scarcely a conjecture can be formed. The shore natives say that the people are ferocious and numerous; perhaps this can hardly be the case, because within the tropics the natives principally subsist upon the products of the low lands and the sea.

Between the eastern and western groups, and to the southward of Vanua-Levu, is a range of islands, of which some are possibly the same seen by Bligh, in the *Bounty's* launch, in his progress westward, in May, 1789, and which then appeared on the charts under his name.

KORO (D'Urville), the GORO of Wilkes, and the Goroo of the charts, is considered by the natives one of the most fruitful islands of the group; it is a high island, though not so much so as the others, and from appearance would be susceptible of cultivation to its very top. It is surrounded by a reef, which is for the most part a shore reef, and affords no harbour; there is, however, anchorage on the N.W. side. The island is $9\frac{1}{2}$ miles long by 4 miles wide. The produce of Goro is oil and tortoise-shell, and exceeds in quantity that of any other island of the group. Its population is 2,000.

The KAUMONU or HORSE-SHOE REEF lies between Koro, Neirai, and Vakia. It is an extremely dangerous one. Its name indicates its shape, and its opening is on the North side. It is even with the water, which after stormy weather may be seen breaking on it. It is one mile in diameter, and has no danger about it nearer than the North reef of Neirai. Capt. Bethune, R.N., recommends passing round North of Neirai, and between it and Vateki (Ambatiki), thus avoiding the Kaumonou (a term which appears to be the general name for a reef); also the reefs off Wakaia, and keeping farther to windward.

NEIRAI, the NAIRAI of Wilkes, and the *Nirie* of Arrowsmith, lies to the South of Koro. It was seen by D'Urville, but was more completely surveyed by the American Expedition. They first anchored on the West end of the *Onoruga Reef*, that extends off from the middle of Neirai, 5 miles in a westerly direction. There is a passage between this and the *Mothea* or *Eliza Reef*, stretching off from the island towards the South; and there are also a passage and harbour between the reef and the island. The *Cobu Rock* is a good mark for the former passage when it bears East. It lies a mile South of the South point of Neirai.

The boats anchored in the Harbour of *Venemole*, on the West side, which may be known by two small islets joined to Neirai by the reef, which forms a protection against the North winds, and vessels of any draught of water may anchor here in 15 fathoms, with good bottom, from a quarter to half a mile from

the shore. Somewhat farther to the southward is a 3 fathom bank, which is the only danger that exists inside the reef towards the Cobu Rock or S.W. passage. About a mile to the North is *Venemole Bay*. It is circular, with a narrow entrance, affording seemingly a good harbour; but on examination this entrance proved to be quite shallow. The bay had the appearance of having been an old crater; at low water it may almost be said to become a lake. The officers were much struck with the beauty of the bay. It contains a village of the same name, and also another called *Fulailai*, but both are small. The natives were quite peaceable.

They anchored at night off the town of *Toaloo*, which lies in a bight at the North end of the island, and proved the largest town on the island.

Neirai is famous for its manufactures of mats, baskets, &c., a large trade in which is carried on throughout the group by exchanges.

The reef extends from the island 4 miles northward, and, where it ends, turns for a short distance to the westward. There are a few patches of rock on its western side, but none farther from it than half a mile. This is the reef on which the U.S.S. *Flying Fish* struck on entering the group, and where she was near being lost. It does not join the island, but is connected with the *Mothea* or *Eliza Reef*; and there is between it and the island a good ship channel, leading to the large Bay of *Corobamba*. On the eastern side of this bay there is safe anchorage in 13 fathoms, with a white sandy bottom. The reef extends to the South, and then passes between Cobu and Neirai to the S.W. The only danger is a small coral patch, lying E.S.E. a mile from the South end of the island, and a mile North of the Cobu Rock.

The town of *Corobamba* lies at the bottom of the bay, next in size to *Toaloo*. The *Cobu Rock* is a singular one. It is inaccessible on three sides, of volcanic formation, and is enclosed by the *Mothea Reef*,* which here spreads to the width of about 3 miles, and extends 4 miles farther South, where it forms a rounded point. The eastern side is an unbroken reef, but the western is somewhat irregular and broken, with many openings for boats.

The *Mothea Reef* has obtained the name of the *Eliza Reef* from the loss of that brig in 1809. She had both guns and powder on board, which were thus introduced among the natives, which brought about a great change of power; a large amount of dollars also came into their possession.

NHAO (D'Urville), ANGAU of Wilkes, the *Neow* of the charts, is larger and higher than either Vateki or Neirai. Off its N.E. point the reef extends $1\frac{1}{2}$ miles, and has no deep water inside it. It continues round the East side close to the island; there are several openings, but none fit for a vessel to enter. As the South side is approached the reef extends off several miles, and is very shoal to its edge. There is safe anchorage on the South side, in 20 fathoms water in the bay, and opposite the town of *Lakemba*; but during a southerly blow a vessel would be much exposed to the wind and sea. There are several openings and clear passages through the reef on the N.W. side, and clear water round to the

* The Cobu Rock was found to have a very great effect on the local attraction of the compasses, causing a deviation of $13\frac{1}{2}$ points on the summit; at its foot they were nearly correct.

South; but the bights to the North are full of coral patches. There are villages every few miles around the island. The inhabitants, subject to Ambau, are considered much more savage than those of the other islands in its neighbourhood.

At 14 miles to the South of *Lobo Hill*, the S.E. point of Nhao, is the dangerous *Mumbolithé* or *Mumbolittee Reef*. It is oval in shape, and three-fourths of a mile in length; the sea breaks on it at all times. This must be the reef passed by D'Urville in the morning of June 3, 1827.—(Vol. iv. p. 430).

VATEKI, or AMBATIKI, is in shape nearly an equilateral triangle, surrounded by a reef, which offers no protection for vessels, and only passages for boats. The island is 750 feet high, of a dome shape, and contains 500 inhabitants, all subject to Ambau. The people were civil to Wilkes's party, and gave them yams and taro in plenty, but would not part with any pigs. They live in villages, and appear thriving. The island has very little wood on it. The reefs extend one-third of a mile from its shore.

MOUALA, or MOALA (if it is not the *Mywoolla* discovered by Bligh in 1792), may be considered as a discovery of D'Urville's, for it was very incorrectly placed on the charts under the name of *Merla Eavou*. It is of a triangular form, and may be about 18 or 20 miles in circuit. It is mountainous and volcanic, about 2,000 feet high, and covered with wood. There are some clusters of coconut trees on the shore. There is an opening through the reef, on the West side, that leads to an inferior harbour. The reef on the North side of Mouala resembles that of Totoua, being a collection of sunken and detached patches. The reef on the N.E. makes off to the distance of $2\frac{1}{2}$ miles. After passing it, there is a deep indentation in the island, with a broad passage through the reef, leading to a safe and very fine harbour; and, what is unusual, the passage is sufficiently wide for a vessel to beat out. This, however, would seldom be necessary, as there are several passages through the reef to the westward which are safe with a leading wind.

This island affords wood, water, and some provisions, and has about 700 inhabitants.

The TOVA REEF, probably that which D'Urville was told was *Navatou*, the *only* danger in the vicinity, was found to be about equidistant from Totoua, Mouala, and Vanua-Vatu. It is one of the most dangerous outlying reefs in the group; it is a mile in diameter, and nearly circular; the two former islands are in sight from it, but the latter being low, was not seen. At low water the reef is quite dry, and it then forms a snug basin, into which there is a shallow passage for boats. The soundings within the reef were found extremely irregular, varying from 2 to 14 feet. At high water the reef is entirely covered, and the sea breaks on it at all times.

TOTOUA was discovered by D'Urville June 2, 1827, and is called *Toroia* by Wilkes. It is high, and much broken; it resembles the rest of the group in its volcanic formation; it is covered with luxuriant foliage, and has many fertile valleys. The harbour on the North side can be useful only as a temporary refuge. It is filled with broken patches, has irregular soundings, from 3 to 30 fathoms, and the passages between these patches are quite narrow and tortuous.

Among the whites and natives in the group, the natives have the reputation of

being more ferocious and savage than any other; they are said to be constantly at war, and are obliged to reside on the highest and most inaccessible peaks to prevent surprise and massacre. Water and wood may be obtained here in sufficient abundance, but whoever visits the island should be cautious, and continually on their guard.

MATOUGOU, another discovery of D'Urville's, is the southernmost of this range of islands, and is called *Matuku* by Wilkes.

Matuku was thought by the Exploring Expedition to exceed any of the other islands in beauty. Its face is broken into volcanic peaks, but has many fertile valleys. On its western side is what was named by the Expedition Carr's Harbour, which they state to be one of the best harbours in the group. Its entrance is perhaps too narrow for a ship to beat in, which the prevalence of easterly winds would generally require to be done; but the channel to it is quite clear of patches, and the passage through the reef on the western side is a good one, though long, and the channel is quite clear of patches. Within the reef there is a circular basin of large extent, in all parts of which a ship may select her berth with good bottom. Wood and water are to be had here in plenty. The natives are skilled in the use of firearms. On the eastern side, between the islands, there is a small opening leading through the reef, but it is full of coral patches, and offers no facility for vessels.

The ISLAND of VITI-LEVU is the largest of the Feejee group. From the imperfect acquaintance with the natives of the group, it has been very variously denominated. Mariner (Description of the Tonga Islands) calls it *Naviki-Levoo*, evidently the correct name in the Tonga dialect. On the charts it has been called *Ambow*,* but this refers to the small though very powerful island at its eastern end, which, claiming much authority in the group, has caused its name to be so much extended. The name is *Viti* or *Vitchi*, corrupted into *Feejee*, *Fiji*, and the other names bestowed upon the group. The affix *Levu* means "great." Thus *Viti-Levu* means Great Feejee. It is about 80 miles in length by 55 in breadth. It has been penetrated some distance in its S.E. part, as hereafter stated; but nothing more of its interior is known. According to M. Gaimard, who accompanied D'Urville in 1827, the population amounts to 20,000 (*Voyage de L'Astrolabe*, vol. iv. p. 712); according to Wilkes it amounts to 88,000 (vol. iii. p. 323).

The south-eastern part of the Island of Viti-Levu is low, and its East point is divided by several small and unimportant streams, and there is a passage through one of them, at high water, and for canoes from *Ambow* to *Rewa*, 10 miles distant, on the South side of the island.

The *Harbour of Rewa* is formed by two small islands, called *Nukulau* and *Mukalau* (*Nougou Laho* and *Nougou Loube* of D'Urville), with their attached coral reefs, and has three passages into it. The two southern ones are safe, though

* Capt. Sir Edward Belcher says, in following the usual name,—"At present there are so many doubts about the *proper* name of the main island, that I retain '*Ambow*,' this being the name understood by the chiefs and natives, and it has stood sufficiently long on the charts for preference. I think that although it is *Ambow* on the charts, that it should be written *Ambamo*; *Bāuō* (*Māuō*) being the residence of the principal or king." But as Wilkes and D'Urville, who collected much information relative to this, both agree, the above observations will carry more weight.

narrow, but the northern one is much obstructed by coral lumps, on one of which H.M.S. *Sulphur* struck in entering. The port is a secure one, and the anchorage, which is off the Island of Nukulau, is about 3 miles from the mouth of Wailevu or Peale's River, and 6 from the town of Rewa, which is situated on a low piece of land, which the river, passing on each side of it, has formed into an island.

The *Wailevu* or *Peale's River* was penetrated by Capt. Bethune, of H.M.S. *Conway*, for a distance of about 30 miles; Wilkes's party reached a few miles farther. The mountain district is at about 36 miles from the mouth. The natives state that it flows from a large lake in the interior, and that one of its upper branches runs to the South, and falls into the sea at Indibi, on the South shore. The country through which it passes is thickly populated and well cultivated.

NUKULAU is a low, sandy island, well covered with wood. On the eastern side it has an extensive coral reef; but the western is clear, and may be approached closely. There is a pool of water on the island, but no one could water a ship there without risk of causing sickness on board.

Sir Edward Belcher says:—"The town of Rewa is about 6 miles up the river from the anchorage, and 2 miles from the mouth of the river. It is only to be approached by boats, which are "punted" up, on account of sand-banks having not more than 3 feet water on them, the rollers also sometimes cause a ducking on them. The town, about half a mile from the bank, consists of houses built with posts, about 7 feet high, with very loftily pitched roofs, thatched, and having an ornamented pole across the summit.

"The anchorage at Nukulau is safe, as well as convenient. Two safe and easy passages lead into it, and with the assistance of the chart, vessels can enter at all times without a pilot. The eastern channel, by which the *Sulphur* entered, is also safe if assisted by the chart and a boat ahead. The best anchorage is in 12 fathoms, with the outer island barely shut in with Nukulau, about 2 cables' length from the shore, in a muddy bottom. The strongest breezes blow from South to S.W. Water can be had at Nukulau, or by sending up the river. The *Sulphur* watered at the island."*

There are two entrances to this anchorage; one, the South passage, leaving the two small islets on the starboard hand; the other, the eastern passage through the reef, more to the eastward, passing between the two islets, and hauling round the northern one. The best anchorage is with the two islets in one, in about 10 fathoms. Farther to the East there are some awkward patches not always visible.

For quitting the anchorage, the best passage is the southern one; you can, however, pass inside the reefs and get through the eastern one, having taken the precaution of putting canoes on bad spots. A remarkable hummock to the westward on with the North passage islet, leads into the East passage clear of a patch.

Among these reefs a good lookout from the mast-head is the surest guide. The flood tide appears to set to the westward within the reefs.

During the summer months there is a breeze off the land in the morning. In August we thought that we perceived that the trade wind was more easterly in the morning.

* Voyage of the *Sulphur*, vol. ii. pp. 48-9.

The southern passage possesses the advantage of the weather point of the reef projecting more to the sea than the lee one, thus preserving the water smooth in the passage. To communicate with the town, if there be any surf on the bar of the river, which generally breaks, I recommend taking the channel West of the point. To get water you must send as far as the town, occasionally farther, filling from the river. Attend to the tide about crossing the bar; once I got three turns in the day, usually only two. There is not much wood in the neighbourhood, the banks of the river being chiefly mangrove.*

Ten miles West of Rewa Roads is *Suva Harbour*, which Wilkes states to be an excellent one, spacious, free from shoals, well sheltered, and with good holding ground, easy of ingress and egress, with an abundance of wood and water. The entrance to it through the reef is narrow and deep.

To the S.W. of Suva, off the South coast of Viti-Levu, are the Islands of Mbenga and Namuka, surrounded by reefs.

MBENGA, the largest, like all the large islands of the group, is basaltic. Its shape is oval, 5 miles long by 3 miles wide. It rises on all sides into two very prominent peaks, 1,289 feet in height. On its North side is *Sawau Harbour*, 2 miles deep and 1 mile wide, with a narrow entrance. It has good anchorage in 4 to 10 fathoms, mud. On its West side is another, called by Wilkes *Elliott's Harbour*; this is not so deep as the former, but more open at the entrance, and is surrounded by equally high land. On the left of the entrance is a white sand beach, and a neat village of about thirty huts. There are two small islands near Mbenga: one to the South, named *Stuarts*, and the other to the East, called *Elizabeth*. The natives of Mbenga were found to be civil, and brought bread-fruit, yams, &c., to trade.

NAMUKA is within the same reef as Mbenga. The natives, about 100 in number, were found to be very friendly. The reef on the N.W. side was found to contain many ship passages. To the North of it is *Bird Island*, and the reef off this part of Viti-Levu nearly joins that of Mbenga. To the North and N.W. of it are *Whippy* and *Granby Harbours*, which afford good shelter. Seven miles West of the latter are some red cliffs, and there is no opening or shelter along the South coast until we come to *Ndronga*, 36 miles from Namuka. The harbour (if it may be so called) of Ndronga affords no protection against S.W. winds, and is only suitable for small vessels.

The reef from this point westward increases in distance from the shore from 1 to 2 miles. It extends to the westward 6 miles farther, whence an opening in the reef occurs, which leads to a harbour. The entrance is narrow, and open to southward and westward. There is a small islet, with cocoa-nut trees on its eastern side.

Five miles beyond this is the *Malolo Island Passage*, where the great sea reef from the westward joins, having two entrances, the eastern one named by Wilkes the *Navula Passage*, the western the *Malolo Passage*.

The shores of Viti-Levu are here low, but the land within a short distance rises

* The preceding directions are by Capt. Drinkwater Bethune, of H.M.S. *Conway*.—See *Nautical Magazine*, February, 1842, p. 78.

to the height of 1,000 feet, and has a brown and barren appearance. It is destitute of trees, except on the low points along the shores, which are covered with mangroves and cocoa-nut groves. Here and there is a deep valley or mountain top clothed with wood, which is seen in no other places. This may be accounted for by the practice of burning the yam beds, and clearing the ground by fire, rather than from the extra dryness of the lee side over the weather side of the islands. Beyond the immediate coast the land rises in mountain ranges between 4,000 and 5,000 feet.

The NAVULA PASSAGE is a very remarkable opening; it has for its portals two small islands of nearly the same size (named by Wilkes *Waldron* and *Spieden*, after his pursers), between which the tide rushes with great strength. The great sea reef appears to be here broken asunder by some convulsion of nature, and the rushing tide has entirely swept away the fragments, leaving a fine open passage between the two islands of a mile in width. The passage has nearly the form of an elbow, and ought not to be attempted with a contrary wind, as there would not be room to beat through, except in a small vessel.

MALOLO ISLAND lies off the western end of Viti-Levu. It has obtained an undue notoriety from the proceedings of Capt. Wilkes, arising out of the massacre of two of his officers, Lieutenant Underwood and Midshipman Henry, by the natives, July 24, 1840.

It consists of *Malolo* and *Malolo-Lailai*, or Little Malolo, separated by a narrow and rocky interval. Upon the larger island are two towns, Sua Lib and Arro, the former on the S.W. side. These were destroyed by the American party in retribution for the murder of their associates. To the northward of Malolo is a group of small islets, to which the name of *Underwood Group* was given; and upon *Henry Island*, a small sandy islet, one of the easternmost of the group, the two officers were buried.

To the N.W. of Malolo is a numerous cluster of islands, which D'Urville named CHAPTAL ISLANDS, but which Wilkes superseded with the name of Hudson's Isles, particularizing them by the names of the officers in the Expedition. To the northward of them the great sea reef does not appear between them and the southern islands of the Asaua group.

To the northward of the Chaptal Islands, on the coast of the main island, is a passage through the sea reef, named the *Ba Passage*. The town of *Ba* is 14 miles farther on. The land close to the shore is low, but it gradually rises for 5 or 6 miles in hills from 500 to 700 feet in height, and here and there through the breaks may be seen the distant blue mountains towering above them. The natives here speak a different dialect to those of the *Ba*, or eastern district of Viti-Levu. Ten miles farther on is the town of *Dongaloa*, on the coast. The country in this vicinity so far changes its aspect that the high lands approach nearer the shore, and level ground is only to be seen in narrow and contracted valleys. The whole extent of coast does not appear to be thickly cultivated, though it is not without inhabitants.

The Island of MALAKI, which lies adjoining to the northernmost point of Viti-Levu, is 800 feet high, and has the appearance of having been well cultivated at some former time. On the top are the remains of a stone fortification. It is

divided from the main island by a narrow strait, and off it is a passage through the sea reef.

WAKAIA, MOKUNGAI, and MOKUNDRAGA lie to the N.E. of Ovolau, from which they are visible, and separated by a strait of 10 miles in width. Although several miles apart, they are situated within the same reef. Wakaia is the southernmost. There is a remarkable shelf formed near the centre of the island, which goes by the name of the *Chief's* or *Chieftain's Leap*, from a tragedy which happened some years ago. There are several openings through the reef near Wakaia, on its eastern side, but they cannot be recommended except for small vessels. The entrance on the S.W. side, leading to *Flying Fish Harbour*, is quite narrow. On the West side of Mokungai, the island next northward, there is also a small harbour, formed partly by reefs, and partly by the little Island of Mokundraga. Wakaia now contains about thirty inhabitants, while Mokungai, whose population has been once exterminated after a bloody battle, has only one or two families.

The reefs extend from these islands, with few interruptions, up to the South shore of Vanua-Levu; but just to the westward of Mokungai is the *Mokungai Passage*, which at times may be difficult from the tides, the flood running to the North and East, and the ebb in the reverse direction. It is most probable that it was through this pass that Lieutenant Bligh pursued his course to westward, in the *Bounty's* launch, in 1786.

"This part of the group is dangerous in dark nights and uncertain weather, no anchorage nor shelter being within reach, nor can any of the passages between the long belt of reefs which extend from the South side of the Island of Vanua-Levu to the South side of Viti-Levu, an extent of 60 or 80 miles, and which forms a lee shore, be attempted at night, these difficulties being increased by the uncertain set of the currents, which are often strong. It is necessary, indeed indispensable, that to sail amongst the reefs and shoals of these islands, with any degree of safety, the day should be clear, and the sun bright and behind the ship, and the time of low water chosen, if possible, when they can always be distinctly seen, and with care avoided; and when the sun is ahead of the ship, or the day becomes dull, she should be at once anchored, as the shoals can no longer be distinguished; this remark of course attends to vessels navigating inside the different sea reefs, for without them there is no anchorage."—(Capt. Worth, R.N., H.M.S. *Calypso*, 1849.)

The ISLAND of OVOLAU* ("OBALAUO," Sir Edward Belcher) is 8 miles in length, North and South, by 7 miles in breadth, East and West; it is of volcanic formation, and its rocks are composed of a conglomerate or pudding-stone; it is high and rugged throughout. The valleys only extend a short distance into the interior, and leave but little level ground; they are, however, exceedingly fertile and well cultivated. Its harbours are all formed by reefs, and were it not for these, there would be but few in the group. That of Levuka or Libuka, on its East side, is safe, has good holding ground, and is easy of access. Ovolau is the

* This island, like most others of the group, has received many versions of the same name. On Arrowsmith's chart it is called *Bulloo*; D'Urville calls it *Onalau*; Sir Edward Belcher, as above, spells it *Obalauo*; and Wilkes, who made it his primary station, *Ovolau*.

principal residence of the white men of the group, to whose good conduct Capt. Wilkes bears testimony. They were the interpreters employed by the vessels of the Expedition.

Capt. Wilkes says :—" In approaching Ovolau, each island had its own peculiar beauty ; but the eye as well as the mind felt more satisfaction in resting upon Ovolau, which, as we approached, had more of the appearance of civilization about it than the others ; it is also the highest, most broken, and most picturesque. At daylight, on the 8th of May, 1840, we were off the Port of Levuka, and made all sail for it. At nine o'clock, being off the entrance, I took the precaution, as the breeze was light, to hoist the boats out (having to pass through a passage only 800 feet in width), and send them ahead to tow. At first it is not a little alarming to approach these entrances with a light wind, and often with a strong current setting in or out ; the ship rolling and tossing with the swell as she nears the reefs, the deep blue water of the ocean curling into white foam on them, with no bottom until the entrance is gained, when a beautiful and tranquil basin opens to the view.

" The remarkable peculiarity of these coral harbours, if so I may call them, is that in gaining them it is but an instant from the time the sea is left until security is found equal to that of an artificial dock ; this is particularly the case with the Harbour of Levuka."

The Town of LEVUKA contained, at the time of Wilkes's visit, about forty houses, but has since been entirely burnt down in the native wars, which are still continuing, 1849. It was situated in a quiet and peaceful valley, surrounded by a dense grove of cocoa-nut and bread-fruit trees, with a fine stream of fresh and pure water running through it to the beach : high, broken, volcanic peaks rise to the West, forming the background. The Peak of Andulang, which was ascended, was estimated to be 2,070 feet high ; the highest, *Dille-Ovolau*, being about 200 feet higher. From the summits, the fantastic needle-shaped peaks of Vanua-Levu are distinctly seen, though 60 miles distant.

The Harbour of Levuka, says Capt. Worth, is decidedly the most convenient anchorage in the Feejee group, being more central than any other, with its entrances so clear and attainable, that no accident can happen with common caution ; added to which, it is the only harbour where water can be easily obtained, a fine stream of which runs into it from the mountains abreast of the anchorage, and from which it can be rafted off with great expedition and facility. The anchorage is entirely sheltered by a reef which runs nearly parallel with the shore, distant from it about half a mile, and which keeps the water always smooth. He completed water, and procured wood from the wreck of two American ships that lay on the beach, one of which had some years since been burnt, and the other, a brig, had been driven from her anchors about three months before his arrival, during one of the hurricanes.

The Island of MATORIKI (MOTURIKI of Wilkes) is almost in contact with that of Ovolau, to the South of it. The same reef surrounds both of them, and there is no passage between them except for boats and canoes. A large, square, castellated rock lies midway between them, called *Laudolib*. Matoriki is 3 miles long and 1 broad ; it is not so much broken as Ovolau, though it rises in

the centre, forming a high ridge. There are two small islands, named *Lelavia* (*Lele-Oubia* of D'Urville) and *Thangala*, to the South of it, and between these and Matoriki is the entrance to the Bay of Ambau, termed the Matoriki Passage.

The MATORIKI PASSAGE is of considerable importance, as it leads to the Bay of Ambau, which contains some of the most powerful of the native towns, is clear from obstruction, and is $1\frac{1}{2}$ miles in length by half a mile wide. An East by South course (by compass) leads through it, and when Black Peak, on Viti-Levu, can be seen, it is a good leading mark. The tide sets with some strength through the passage, the flood running to the westward, or in, and the ebb to the eastward, or out. There is safe anchorage either under Leluvia or Matoriki on their West side, in from 7 to 12 fathoms; but a good and safe harbour exists on the Matoriki side by entering through a narrow channel before reaching Thangala Island. This channel may be known by a large coral rock on the reef. After getting through the reef there is anchorage in from 7 to 10 fathoms, with sandy bottom.

The whole BAY of AMBAU is well sheltered by extensive coral sea reefs. *Ambau* is a singular looking place. It occupies a small island, a mile long by half a mile wide, which is entirely covered with houses, among which the mburè stands conspicuous. The approach to the town is much obstructed by reefs of coral, and the water being shallow, is impassable for an armed vessel. The island is connected with the main-land or large island by a long flat of coral, which is fordable, even at high water, and is in places quite bare at low water. The towns of Viwa and Verata are within a short distance of Ambau, and both have been its rivals. At each of these some fearful outrage has been perpetrated upon trading vessels.*

“Wilkes, in his examination of the Bay of Ambau, has placed within it various reefs and shoals; but the positions of many of these are erroneous, and there are very many existing which he has not shown at all. I am of opinion his plan of this bay is not intended as a correct survey of it: indeed I do not conceive it possible that so extensive a sheet of water, bestrewed as it is with shoals, could be effectually surveyed in the time, and with the means he was enabled to command. His positions of the different islands and sea-reefs appear to me to be very faithfully placed.

“On the 19th of June, 1848, at 1^h 30' P.M., I weighed from the anchorage of Viwa, and proceeded to that off a town called *Ngundavam*, having on board an English and a native pilot, which town is distant about 12 miles to the northward of Viwa, and situated on the coast of the large Island of Viti-Levu; my object in visiting that place being to demand the murderers of two Europeans, who had been surprised whilst trading in a boat along the shore by the natives of that town, robbed and massacred; and, in the event of a refusal, to burn their town. The route to this place was found most intricate, and studded with reefs and shoals, through which we had much difficulty in finding our way, being corned as before from the mast-head, and having a canoe with native pilots on

* The *Aimable Josephine* was cut off in July, 1834. In retaliation for this D'Urville destroyed the town of Viwa, in 1839. Another instance is cited by Capt. Worth.

board, and one of our own boats with the second master. Keeping a couple of cables' length ahead of the ship, sounding, &c., we reached the anchorage on the third day, being obliged frequently to anchor, and having once grounded, but the bottom being soft mud no harm was done, and the ship easily hauled off; the tacking up was about 1,700 yards from the shore, between which and the ship was a flat coral reef, partially dry at low water, and extending within 2 cables' length of where she was anchored in $3\frac{1}{2}$ fathoms water. Having failed to induce the natives of Ngundavam to give up the murderers, it was bombarded, and finally destroyed by fire; and, on the morning of the 23rd, I weighed with the intention of proceeding to Levuka-Ovolau; but the same difficulty was experienced in threading our way through the shoals that lay in that direction; and notwithstanding the precaution taken in examining and buoying off as many as we could discover, and conning her from the mast-head, she ran upon a coral patch; the ship, however, backed off, assisted by the removal of the foremost guns and some shot aft, without receiving any damage. On approaching the Matoriki passage, through which we beat out of the Bay of Ambau, the boats being still ahead looking out and sounding, after making twelve boards, we passed through and arrived at Levuka."*

THE ISLAND OF VATU-LELE, which lies to the South of Viti-Levu, was discovered by D'Urville, June 7, 1827. It has the appearance of a raised coral island, but is of volcanic formation. The North part is about 70 feet high, and it gradually descends to a low point at its southern end. There is no more than a narrow shore reef on its western side, but on the eastern shore a reef extends off 2 or 3 miles, forming a kind of bow from the South to the North end of the island, but it has no opening except for boats. Near its North end it encloses several small islets. Vatu-Lele is well covered with wood, and is inhabited.

At 7 miles E. by S. from the South point of Vatu-Lele is a dangerous coral reef, which is awash, and extends about 300 yards North and South, by 150 yards East and West. Wilkes calls it the *Flying Fish Shoal*, though it is not improbable but that it is the same made by D'Urville in approaching Vatu-Lele.

KANDABOU, or, as it is named by Capt. Wilkes, KANTAVU, is the southwesternmost of the Feejee Islands. It was most likely first discovered by D'Urville, in June, 1827. He surveyed the southern shores.†

Kandabou is 25 miles long, and throughout its whole length is high and mountainous, except a small part at its centre near Malatta Bay. The island is well covered with pine timber, resembling the New Zealand kauri pine; and most of the large canoes used in the Feejee Islands are built here. The people are industrious, and, it is said, have abundance of provisions. Many whale-ships stop here for supplies; they are principally English, from Sydney, and they

* Capt. Worth, H.M.S. *Calypso*.

† D'Urville sought this island as being the Mywolla discovered by Bligh in his *second* voyage, in 1792. But it certainly would seem that Mywolla is the same as Mousala, to the E.N.E., and that Bligh passed between Totoua and Matougou, because there are no islands to the S.W. of Kandabou, as marked on Bligh's track, in such a situation. The distance, bearings, and drawing, are so bad in Bligh's track, that the discrepancies are not too great for such an assumption.

generally go to Tabuca Bay, to the West of Malatta. Wilkes says there are forty-five towns on the island, making its population 2,000.

On its West end is the *Peak of Kandabou*, which is a mountain in the form of a cone, very much truncated at the summit, and the sides descending with a direct and rapid inclination from the summit to the sea. D'Urville considered it to be 2,000 feet high.

Tabuca Bay is a very picturesque spot, and there is a large settlement there. Anchorage may be had off the town in 15 fathoms, sandy bottom.

Malatta Bay is small, and offers safety to a few vessels for temporary anchorage, although it is difficult to choose a place for the purpose, on account of several reefs that lie across it. The island is here nearly divided into two, and so low and narrow is the isthmus, that the natives frequently transport their canoes over it.

The most northern coral shoal is off Malatta, and it is the only place where there is any detached reef off the whole length of the northern shore of the island. Off *Cape Bligh*, its East end, is the *Island of Oumbenga*, or *Ono* of Wilkes, 80 feet high; and between it and Kandabou is a good and well-protected harbour. To the North is a cluster of eleven small islands, without inhabitants; some of them produce a few cocoa-nuts, and there is good anchorage near. They are all situated in the *Great Astrolabe Reef*, so named from the remarkable escape of that ship from wreck, on the night of the 5th of June, 1827; Capt. D'Urville just cleared the reef by a cable's length in passing down its East side from the northward. For a few moments the fate of the *Astrolabe* seemed inevitable. From Oumbenga this reef trends nearly North; on its East side it is quite unbroken, and extends in a sweep round Oumbenga, joining Kandabou. On its West side it is much broken, and has several safe passages through to the group. At the North end of the reef is a clear passage through it. The water within is very deep, and whales were seen inside. The reef is not only dangerous from its extent, but from the strong currents, generally to the eastward, which prevail here.

The people are not to be trusted, and boats' crews visiting the island ought to be exceedingly cautious.

The latitude of the point of the reef off Malatta Bay Wilkes gives as $18^{\circ} 58' 34''$ S.

The westernmost range of the Feejee group, called the *ASAU GROUP* by Wilkes, are possibly the islands discovered by Capt. Maitland, of the American vessel the *Anna and Hope*, and named by him the *Land of Liberty*, and also the six islands seen by the *Arthur*, Capt. Barber, in 1794. D'Urville passed along the outside of the South portion of them, but meeting with a coral bank (perhaps that to the N.W. of Malolo), he bore away to the westward, thus concluding his examination of the Feejees.

VOMO is the south-easternmost of the Asaua group, and is famous for its turtles, which are abundant here from December to March. The southern half of the island has a high, narrow, and almost perpendicular bluff; the northern half is sand, covered with bushes, and resorted to by pigeons. It is 2 miles in circumference; and off its N.W. end is a detached rock, named from its appearance the *Castle Rock*. There is anchorage, but not well protected, for a small vessel.

Twelve miles West from Vomo is a group of small islands, to which Capt. Wilkes has given names, but which had been previously named *Bitonho Island* by D'Urville, of which he takes no notice. The interval between is occupied by a continuous line of reefs.

To the N.W. of Vomo is the Island of WAIA, which is the highest and most broken of the Asaua group, its peak being about 1,641 feet above the level of the sea. Connected with it to the southward are *Waialailai* and *Waialailaitake*, all very rugged and broken. One of the peaks on the latter, named *Observatory Peak* by Wilkes, is 555 feet high. Waia is said to be fruitful, but appears little better than a craggy rock; it is thought to contain about 3,000 inhabitants. It is surrounded by a few patches of coral reef, but not enough to afford it a harbour. The western sides of the islands are very much worn by the sea, in consequence of there being no sea-reef to protect them from the full swell of the ocean, which is very great here at times.

NAVITI, to the North of Waia, is the largest of the group, and rises to the height of 954 feet. There is no anchorage around Naviti. This and the islands to the northward have passages between them, and are little incommoded by coral reefs. They have all many small villages on them, which are generally built on a snug bay, and have near them a secure place of retreat on the top of some inaccessible rock. To the southward of Naviti are some small islands named by Wilkes *Eld*, *Foze*, *Agate*, and *Sinclair Islands*.

YA-ASAUA is the northernmost of the Asaua group. It is very narrow, and about 10 miles in length. Towards its southern end it rises into a high peak, called *Tau-tha-ke*, 781 feet in height. From the summit of this peak the beautiful little bay of *Ya-sua-y-lau* appears to lie at the feet, with the picturesque rock on its eastern side, having much resemblance to a ruined castle or impregnable fortress. This rock, which is entirely volcanic, with but little vegetation on it, is the subject of some superstition among the islanders, who believed it to have been the residence of an immense bird. The southern bight is well protected, except from the N.W., by the small Island of *Ovawo* and two small islets. Between Ya-asaua and Naviti are a number of smaller islands, having clear passages between them. Off its North point are several small islets.

BIVOUA, the *Brva* of Wilkes, is the westernmost of the group, and lies 12 miles West from the South point of Naviti. It is a long, low island, with two smaller ones connected with it, covered with cocoa-nut trees. It is surrounded by a reef, which extends 3 miles to the South of it. Near its southern end is the opening, but it is not practicable, even for a small vessel, without danger, from the numerous coral lumps. The island, which affords no anchorage, is inhabited by about fifty people. Eight miles to the North of it is a coral shoal, on which the *Porpoise* struck, and occasional soundings were met with over the whole space to the East of it.

Awakalo or *Round Island*, though separated by a clear channel from the Asaua group, is the only islet in its neighbourhood. It is of a crescent form, rising to the height of 500 feet, and dropping at each end. There is no coral attached to it, but an extensive patch, on which there is anchorage, lies to the eastward, apparently unsafe however.

CHAPTER XXVII.

NEW HEBRIDES, ETC.

QUIROS was the first to discover any portion of this fine but little-known archipelago. He saw the northern and largest island of the group, which he named *Australia del Espirito Santo*. The extent of this land, and of the bay in which they anchored, that of San Felipe and San Jago, which is 20 leagues in circuit, led them to the most exalted notions of its importance and magnitude. They concluded that it must be a portion of the long-talked-of and sought-for southern continent, but they made no explorations to satisfy themselves that their conjectures were well founded. In the different narratives which have been brought to light on this important voyage, there is no mention made of other islands. Quiros speaks only of one land; and in the memoir to King Philip III., on the colonization of this new continent, it is described as abounding with gold, silver, and pearls.

These visions as to the character of the land were dispelled by Bougainville, who saw that the northern part was composed of several islands, to which he gave the name of *Cyclades*. Cook discovered the greater portion of the southern chain, to which he applied the name of *New Hebrides* in 1773. Thus the group collectively possessed two appellations, and it was proposed to limit each to the North or South portions; but as there is no marked division in the chain, and as Cook discovered the greater number, his name of New Hebrides has superseded those previously applied to them.

It does not appear that any navigator visited the group after Cook until Capt. Golownin anchored in Port Resolution in 1809. He has given some interesting details as to the people in his second volume. Subsequent to this again we have but very few and scattered notices, so that our knowledge of this may be said to be as imperfect as of any collection of islands in the Pacific. It will be therefore rendering great service to hydrography if any addition to our stock of knowledge could be acquired, and the attention of the mariner is respectfully directed to this.

We have but little to say on the islands except those details quoted in the succeeding descriptions, which comprise almost the entire published accounts.

ANNATOM is the southernmost of the New Hebrides. D'Urville, who sailed around its southern side in June, 1827, says it is surmounted by high mountains, which leave only a very narrow belt of low land on the shore; on this belt some clumps of cocoa-nut trees are seen scattered here and there, and more particularly a great number of trees with scanty foliage and bare trunks, which at a distance look very much like whitened skeletons standing up. From their appearance he supposed them to be a species of the *Melaleuca leucadendron*, which furnishes the famous cajepout oil (kaïou-pouti). The mountains have but few large trees, although generally covered with verdure; in many parts large reddish patches,

showing an ochrey soil. The island appeared free from reefs, at least all its North and West parts.* It is 10 miles long, East and West, and 6 miles broad, from North to South.

It has a harbour on the S.W. side, formed by a sand islet and reefs, but it is open to westerly winds.

It is, however, safe from April till October (the S.W. trade blowing steady during these months), and is resorted to by sandal-wood vessels occasionally.

Excellent fresh water can be obtained within a short distance of the anchorage, and firewood can be procured in abundance. The natives are similar in appearance to those of Tanna, and their manners and customs much the same. The immolation of widows is practised here. The island hardly produces food enough to supply the wants of the inhabitants, and consequently visitors can obtain no refreshments from the natives.

Mr. James Paddon formed an establishment at this island in 1843, and has remained there since. He has several houses built on the sand islet where he resides, and three or four small vessels engaged collecting sandal-wood from the other islands. Ships in want of supplies can generally obtain anything they require from Mr. Paddon, at a moderate price.†

Capt. D'Urville makes its West point in lat. $20^{\circ} 11' 25''$ S., lon. $169^{\circ} 35' 44''$ E.

ERRONAN is an isolated cone, considerably truncated, with steep sides. Its summit is N. 25° E., 45 miles distant from Annatom. It is an enormous mass, not more than 4 or 5 miles in circumference, and is sufficiently high to be seen 45 miles off. It is also called *Footoona*. Its summit, according to D'Urville, is in lat. $19^{\circ} 31' 20''$ S., lon. $170^{\circ} 6' 20''$ E.

IAIRROC, another island, is stated by the natives to lie perhaps 19 or 20 miles S.S.E. from the S.E. point of Tanna.

TANNA ISLAND.—Tanna was discovered by Capt. Cook in August, 1774. "At daybreak, August 5, we saw a low island (*Immer*) to the north-westward of us, having passed close to it during the night, and a high one nearly East of us (*Erronan*), at the distance of 8 or 9 leagues. The large island (*Tanna*), towards which we still directed our course, extended from N.W. to S.E., and consisted of a high range of mountains. Towards the south-eastern extremity, at the end of a secondary range of hills, we discovered a volcano, of which we had really seen the fire at night. It was a low hill, much lower than any in the same range, and of a conical shape, with a crater in the middle. Its colour was reddish brown, consisting of a heap of burnt stones, perfectly barren, but it offered a very striking sight to our eyes. A column of heavy smoke rose up from time to time, like a great tree, whose crown gradually spread as it ascended. Every time that a new column of smoke was thus thrown up, we heard a very deep rumbling sound, like thunder, and the columns followed each other at very short intervals. The colour of the smoke was not always the same; it was white and yellowish in general, but sometimes of a dirty reddish gray. The whole island, except the volcano, is well wooded, and contains abundance of fine cocoa-palms: its verdure,

* Voyage de *L'Astrolabe*, tome iv. p. 461.

† Nautical Magazine, November, 1848, pp. 575-6.

even at this season, which is the winter of these regions, was very rich and beautiful.—(Forster, vol. ii. p. 261.) The island is highly cultivated. The produce of Tanna is bread-fruit, plantains, cocoa-nuts, a fruit like a nectarine, yams, taro, a sort of potatoe, sugar-cane, wild figs, a fruit like an orange, but not eatable. The sugar-canes and yams are of a superior quality. Hogs were not scarce, but the inhabitants would not part with them, even for hatchets; a few fowls were also seen."

The flames of the volcano before alluded to were seen by D'Entrecasteaux at the distance of 20 miles.

PORT RESOLUTION is to the eastward of the volcano, and was named by Cook after his vessel :—" We stood on into the harbour, which has a narrow entrance; and, as we kept a man constantly sounding in the chains, we were greatly alarmed when our soundings suddenly decreased from 6 fathoms to 3½ fathoms; however, an instant afterwards, we had 4, 5, and more fathoms. It appeared that we had providentially passed over a rock before the entrance, on which we had run the greatest risk of striking. The harbour was a small snug basin, where we let go our anchor in 4 fathoms, surrounded by a number of natives in their canoes.

" This was the only anchorage where we made any stay in all the extensive cluster of islands which we had now discovered. We provided our ship with wood and water, but did not obtain any refreshments worth mentioning. The principal advantage which we derived from putting in here consisted in a few remarks on a race of people in a great measure distinct from all the tribes known to us before. But while we were entertained with various new and striking objects, it was very disagreeable to be tantalized with the sight of wholesome vegetable and animal food, with which the natives did not choose to supply us.

" The *Resolution* was afterwards brought farther into the bay, but in warping her in, she struck aground several times, being drawn out of the deep channel. The water was very smooth, and the bottom covered with mud, so that she could receive no material damage. Capt. Cook remained here until the 20th of August, during which time the friendship of the natives was acquired, and small parties frequently went ashore; but they were not admitted to every part of the island."

Sir Edward Belcher says :—" Port Resolution may readily be found by a very remarkable yellow sandstone bluff at its N.W. angle, and which is situated to the northward of the entrance; also by the smoke of the volcano a little inland from it. Approaching from the southward the entrance of the port might be overshot, by reason of the overlapping breakers; but by bearing in mind that it is formed by the *low peninsular* S.E. angle, and that the entrance is situated about one mile southerly of the yellow bluff, it will easily be found." When Sir Edward Belcher approached it the wind was dead out; but by edging close to the breakers on the left, and then hauling sharp up, the entrance was made, and in four boards a berth was reached inside in 6 fathoms. It is too narrow for a long vessel to work in, and it is preferable to shoot into 15 fathoms, and be prepared to warp. Sir Edward Belcher gives a not very inviting picture of the natives, who evidently would not be the last to show much mercy.*

* Voyage of the *Sulphur*, vol. ii. p. 57.

Point Resolution, within the bay on the East side, is in lat. $19^{\circ} 31' 17''$ S., lon. $169^{\circ} 29' 0''$ E.; var. 12° E. (1840).

The Island of Tanna is very fertile, and well inhabited by a stout race of men, similar in complexion to those of the Loyalty Islands. Like their neighbours they are all cannibals, and by no means should be trusted. The entrance of Port Resolution bears East from the volcano; therefore a ship bound in may always find the harbour by steering towards the volcano, after getting it to bear West. Tanna produces an abundance of excellent yams, and ships may obtain a large supply at a moderate price.*

A correspondent in the *Nautical Magazine*, 1839, gives the following account of the island:—

“Approaching Tanna from the N.W. a beautiful prospect strikes the view: the country appears divided into farms, where meadows, orchards, arable patches, intersected by race-courses, avenues, and footpaths, seem to ape civilization; and, even in the transition state between barbarism and refinement, reminds the British voyager of his native country.

“The volcano, in constant action, during each of our visits to Tanna, and always sublime and awful, is seen on a promontory on the West side of the harbour of Port Resolution, so named by Capt. Cook.

“This harbour, situated on the South point of the island, is considered safe and convenient. Still farther to the westward is a bay, often resorted to by whale-ships.

“The natives of Tanna evince a treacherous disposition; their habits are grovelling, and their persons filthy; their faces are besmeared with turmeric and a sort of charcoal: of their beautifying applications cocoa-nut oil forms an essential ingredient. The use of the betel-nut and chunam is common at this island as well as the rest of the group; the effect of which is visible in the usual black teeth and red lips of a betel-chewer. The language of the natives seems to possess a similarity of sound with that of the Malays.

“The island produces yams, taro, shaddocks, bananas, limes, cucumbers, cocoa-nuts, and a species of sweet potato. Sandal-wood is abundant at Tanna, and several valuable sorts of timber are to be found there: the clubs of the natives are made of ebony; many of them are neatly inlaid with pearl, shell, and stones, and some are beautifully carved. A peculiar sort of hog is found here; we have observed many of them, which, when full grown, are not above the size of a rabbit: rats also are abundant.

“Ships visiting Tanna are under the necessity of establishing a communication with the shore by means of their own boats; the natives have no canoes, using only a sort of raft, with which they dare venture only one or two hundred yards from the beach.

“When the natives come off with these rafts they are always armed, and vigilant to guard against treacherous attacks.”†

IMMER is a small, low island on the East side of Tanna, and is covered with cocoa-nut trees. It bears N. by E. $\frac{1}{2}$ E. 4 leagues from Port Resolution.

* Naut. Mag., Nov., 1848, p. 576.

† *Ibid.*, Sept., 1839, pp. 603-4.

ERROMANGA is high and rocky, and presents an iron-bound shore nearly all round, with deep water close to the breakers, and no hidden dangers. It has no harbours, but anchorage may be found in *Cook's Bay* on the East side, and *Dillon's Bay* on the West. In Dillon's Bay the bank is steep-to; the soundings extend a very short distance from the shore, and the best anchorage is in 12 fathoms off the mouth of the river. No stranger should anchor here unless in a case of necessity, as the natives are hostile and treacherous; and should the wind set in from the westward a large vessel would have little chance of getting under way or beating out. The sandal-wood vessels are always ready for slipping in case of a westerly wind setting in. This island produces nothing beyond the immediate want of the inhabitants, and consequently holds out no inducement for vessels to visit it, except for sandal-wood. Its natives are cannibals, and are darker in complexion than those of Tanna, with woolly hair like negroes.*

On the N.E. and eastern side of this island there are two bays, in the northernmost of which the *Resolution* anchored in 1774. In the latter Capt. Cook had a skirmish with the natives, who attempted to draw his boat on shore, and discharged some stones and arrows at him and his crew; a circumstance which prevented a particular examination of the island. The western coast of the northern bay was covered with thousands of palms, which had a beautiful effect; the second bay extended very far inland, and seemed to contain several snug creeks or harbours. The lands on both sides were covered with the thickest woods, which had a most fertile and enchanting appearance. To the South the land sloped very gently, offering a fine exposure of vast extent, almost wholly cultivated, and in all likelihood rich in vegetable productions.* A saddle-peak, dividing the two bays, was named *Traitor's Head*.

Erromanga has acquired a sad notoriety from the massacre of the indefatigable missionary, Mr. Williams, the well-known author of the "Missionary Enterprise." He had quitted the Samoan group on a tour in October, 1839; and having visited Tanna, they found the natives hospitable, and left Samoan missionaries on it, as the natives of Tanna understood the language. On arriving at Erromanga, they found a barren country, and a different race of men, black, with woolly hair, who did not understand anything of the languages known to the missionaries. They were apparently suspicious, but offered no hostility. Mr. Williams, Mr. Harris, Mr. Cunningham, and the master of the vessel, landed, and were strolling about, amusing themselves with picking up shells, and became separated from each other, Messrs. Harris and Williams being in advance. The natives suddenly raised the war-shout, and Mr. Harris was seen running, pursued by a crowd of them; he was soon overtaken and killed. Mr. Williams then turned and tried to reach the boat, but was killed in the water in approaching it. Mr. Cunningham and the captain got off, but without obtaining the bodies. It was the opinion that the attack was not premeditated, but the desire of obtaining the clothes, &c., of those on shore led to an event, which a single loaded musket in the boat would have prevented. It was a sad occurrence, and excited much commiseration in Europe.

* Naut. Mag., Nov., 1848, p. 576.

† Forster, vol. ii. p. 259.

SANDWICH ISLAND, according to Capt. Cook, is 10 leagues in length in a N.W. by W. and S.E. by E. direction. He only saw its N.W. part at a distance.

Sandwich Island is moderately elevated, and presents a beautiful appearance. It is the finest island of the New Hebrides, and the best adapted for colonization. It produces many varieties of fine timber; the soil is good, and the vegetation luxuriant; yams and sweet potatoes of a superior quality are extensively cultivated by the natives. It also produces bread-fruit, cocoa-nuts, bananas, and sugarcane in abundance. The sandal-wood tree grows on this island.

It is possessed of several good harbours; the one on the West side is spacious, easy of ingress, and sheltered from all winds. It is formed by two large islands, with a narrow passage between them having 5 fathoms water in mid-channel. The southern entrance to this harbour is a mile wide, clear of hidden dangers, and may easily be known by a remarkable island which lies off the entrance to the S.W. This island has the appearance of a broad-brimmed hat, and may be passed on either side. The anchorage is at the N.E. part of the harbour, where soundings will be found; and a ship of any size may anchor in 15 fathoms, one-quarter of a mile from the shore, perfectly land-locked, and secure from all winds. Excellent fresh water and abundance of firewood can be easily obtained near the anchorage. The natives of this island are cannibals, and should not be trusted, no matter how friendly they may appear.

The whale-ship *Cape Packet*, of Sydney, was cut off at this island some years ago, and nearly all the crew massacred; and since that time they have made several unsuccessful attempts to cut off sandal-wood vessels.*

Near its N.E. point are the small islands *Montagu* and *Hinchinbroke*, with two or three islets. Montagu Island is in lat. $17^{\circ} 26'$ S., lon. $168^{\circ} 17'$ E. The western sides of Sandwich Island seemed to be clothed with rich and extensive forests.

Between Sandwich Island and Apee Island, the next larger one to the northward, are several small islands. The range to the S.E. of Apee, which extends for 5 leagues, Cook named *Shepherd Isles*, after his friend, the astronomer.

Three Hills Island lies to the South 4 leagues from Apee, and S.E. $\frac{1}{2}$ S., 17 leagues from Port Sandwich. It is 4 leagues in circumference, and is remarkable for the three mountains from which Cook applied the name. A dangerous reef lies W. by N. from its West point, 5 miles distant; the sea breaks heavily on it.

Two Hills Island lies to the South of the preceding. A high rock lies to the East of it; it is called the *Monument*, and is in lat. $17^{\circ} 0'$ N., lon. $168^{\circ} 35'$.

APEE ISLAND is 8 leagues in length N.W. and S.E. Its North point is in lat. $16^{\circ} 36'$ S., lon. $168^{\circ} 10'$ E. It was not closely examined by Cook.

PAOOM ISLANDS; to the northward of it, were also passed by Cook.

AMBRYM ISLAND lies to the northward of the Paoom Islands. It and the neighbourhood are thus described by Mr. Forster, the companion of Cook:—

“The next morning we had moderate and fair weather, and saw M. Bougainville's southern island (*Ambrym*) very distinctly. There was a passage between it

* Nautical Magazine, November, 1848, pp. 576-7.

and the South end of Whitsun Island, about 6 miles in breadth. A long, low point extended from this southern island to the eastward; and all its North side, though steep towards the sea, rose from thence with a gentle and gradual ascent to the highest mountains in the centre. In the mountains, which were still covered with clouds, we observed some volumes, as it appeared, of smoke, which indicated a volcano. This island is about 7 leagues in length.

"Later in the day we discovered land to the westward, which proved to be (*Mallicollo*) the south-westernmost land seen by M. Bougainville. We advanced towards it, overjoyed with the variety of new islands which presented themselves to our view. Having reached the N.W. end of the former island (*Ambrym*), on which we suspected a volcano, we were convinced of its existence by columns of white smoke, which rolled up with great violence from the summit of an inland mountain. The whole S.W. coast of this island sloped into a very fine and extensive plain, on which innumerable smokes arose between the richest groves which our eyes had beheld since our departure from Otaheite. The populousness of the country was strongly evinced by its fertile appearance and by the number of fires. We opened two other islands to the south-eastward (*Paoom* and *Apee*), after passing the West end of this land, one of which was a very high peak, which looked like a volcanic mountain. Another island, with three high hills, also appeared to the South, at a great distance. The western land, towards which we sailed, was not less beautiful than that which we left. Its groves had the richest tints of verdure, and cocoa-palms were scattered between them in vast numbers. The mountains rose far inland, and before them lay several lower grounds, all covered with woods, and bounded by a fine beach. At noon we came close in-shore, and saw many natives wading into the water to the waist, having clubs in their hands, but waving green boughs, the universal signs of peace. One of them had a spear, and another a bow and arrows. Contrary to their expectations, and perhaps their wishes, we put about again. However, after dinner, two boats were hoisted out, and sent to sound a little harbour, which we observed from the ship. The whole South point of this little bay (*Port Sandwich*), which was bounded by a coral reef, was lined by several hundred inhabitants, of whom a few ventured out in their canoes towards the ship and the boats."

MALLICOLLO ISLAND, alluded to in the previous paragraph, is 18 leagues in length in a N.W. and S.E. direction, and 8 leagues broad.

PORT SANDWICH, before mentioned, is near the S.E. point of this island. Cook anchored here July 21, 1774, and found it very safe. It is 3 miles long in a S.W. by S. direction, and a mile broad. The entrance is between some rocks, which renders it narrow; egress and regress, however, are easy; the depth in the entrance of the harbour is from 20 to 40 fathoms, and gradually decreases to 4 fathoms. Cook anchored in 11 fathoms at 2 cables' length off shore. He places Port Sandwich in lat. $16^{\circ} 25' S.$, lon. $167^{\circ} 46' E.$

MALLICOLLO.—Of the western side of this island Mr. Forster says:—"Mallicollo surprised us again with the beauty and shagginess of its forests, from whence vast numbers of smokes ascended, sufficient to prove that a great part of these forests was inhabited. A spacious bay soon opened to our view, with a fine beach;

and the land about it was, to all appearance, extremely populous and fertile. Two small islands were situated in this bay, and we feasted our eyes on the richness and luxuriance of the prospect, where the brightest tints of verdure were profusely spread.

“Beyond the point, which included the bay to the N.W., the country lost something of its exuberant fertility, and was interspersed with barren spots, though we saw smokes and habitations on the highest ridges: and at night the mountains were illuminated in different places by several lines of fires, some of which appeared to extend at least half a mile in length. We passed the North point of Mallicollo during night, and were a good way advanced in Bougainville's Passage at daybreak on the 24th. Mallicollo lies nearly N.N.W. and S.S.E., and the North point is in lat. $15^{\circ} 50'$ S. The land which forms the North side of the passage appeared very extensive, high, and mountainous, and a number of small islands lay along its southern coast, which were of a very moderate height, and covered with the finest forests.”—(Vol. ii. p. 367.)

Near to the S.E. point of the island is a group of islands, to which Cook has given no name. They may be called the *Maskelyne Islands*, as was proposed by Mr. Wales, the astronomer.* They lie in lat. $16^{\circ} 32'$ S., lon. $167^{\circ} 50'$ E.

WHITSUN or PENTECOTE ISLAND was thus named by Bougainville. It is nearly 11 leagues in length in a N. by W. and S. by E. direction. Its South point is in lat. $15^{\circ} 59'$, lon. $168^{\circ} 19'$. This is 10 miles North of Ambrym Island.

AURORA ISLAND is separated from Pentecôte Island by a channel 4 miles broad, and is of similar dimensions and direction. Its North point is in lat. $14^{\circ} 56'$, lon. $168^{\circ} 6'$ E., according to D'Urville.

LEPERS' ISLAND, or *Ile des Lépreux*, thus named by Bougainville, is to the East of the South end of Aurora. It is about 18 or 20 leagues in circumference. Cook made a close examination of its circuit. It appears, like the others, to be a fine island.

The following extract from the narrative of Cook's exploration in the *Resolution*, by George Forster, F.R.S., describes this and the surrounding islands:—

“We reached the North point of *Aurora Island* at eight in the morning, on the 18th of July, 1774, and passing very close to it, observed vast numbers of cocoa-palms on all parts of it, not excepting the high ridges of the island. The whole, as far as a thick haze permitted us to see, was clad in thick forests, which had a pleasing but wild appearance. My father had a momentaneous glimpse of a small rocky peak to the northward, which M. Bougainville calls the *Pic de l'Etoile*; but the clouds, which moved with great velocity, soon involved it. Having passed the North end of Aurora, we stood to the southward along its western coast, as far as the wind would permit, which blew more southerly than easterly. We had only this advantage, that, being sheltered by the land on all sides, the water was remarkably smooth, though the gale continued. The island, which M. Bougainville named the *Isle of Lepers*, was right ahead of us, and we passed the day in tacking between it and Aurora. At four o'clock in the after-

* *Astronomical Observations, &c., made in the course of a Voyage, &c., Introduction, p. 55.*

noon we approached within $1\frac{1}{2}$ miles of the former, and, in spite of the clouds which rested on its heights, saw so much of the lower grounds that we had reason to think it a very fertile island. The place where we approached it was very steep, nor could we find bottom with 120 fathoms. However, the N.E. point was lower, and covered with all sorts of trees. The palms, in particular, were innumerable, and, to our surprise, grew on the hills, where we had never seen them in other islands. Several considerable cascades rushed down the precipices into the sea, amidst shrubberies which formed as rich an ornament as in the landscapes of Dusky Bay, New Zealand. Having put about, we observed a turtle sleeping on the water, which the violence of the wind did not seem to affect. We tacked all night, in order to gain to the southward, being desirous of passing between the Isle of Lepers and Aurora. We came close under the former again at eight in the morning. Having put about, a small canoe ventured out, with a single man in it. We made a short trip, and returned towards the shore, where three men, in another canoe, were preparing to come to us. Several people sat on the rocks and projecting bluff points. Some were blackened from the head downwards as far as the breast; they had something white on their heads, but went naked, with a rope about the waist. All these people were of a dark-brown colour, and armed with bows and long arrows. Those who came off in canoes came very near us, but refused to come on board. In several places we observed reeds like hurdles, standing up between the rocks, which seemed to be so placed in order to catch fish.

"We now approached the Isle of Aurora, where we observed a fine beach and the most luxuriant vegetation that can be conceived. The whole country was woody; numberless climbers ran up the highest trees, and, forming garlands and festoons between them, embellished the scene. A neat plantation, fenced with reeds, stood on the slope of the hill, and a beautiful cascade poured down through the adjacent forest. The Island of Aurora is about 12 leagues long, but not above 5 miles broad in any part, lying nearly North and South. Its mountain or ridge is sharp and of considerable height. Whitsun Island, which lies about 4 miles to the South of it, runs in the same direction, and is of the same length, but appears to be somewhat broader at its northern extremity. The Isle of Lepers is almost as large as Aurora, but of greater breadth, and its situation is nearly East and West.

"*Whitsun Island*, as well as the Isle of Lepers, having more sloping exposures than Aurora, appear to be better inhabited, and to contain more plantations. At night we observed many fires on them, particularly the first, where they extended to the tops of the hills. This circumstance seems to prove that they live, in great measure, on agriculture; and, since they have but few canoes, and their shores are very steep, fishing does not seem to employ them so much as other islanders.

"The island which M. Bougainville has placed to the southward of Whitsun Island came in sight the next morning, but was still so much involved in clouds, that we could not distinguish its form or height. We passed all that day in working to windward, which we performed with better success, as the gale had a little abated."

ESPIRITU SANTO ISLAND.—This, the largest of the New Hebrides, is, as stated previously, the only discovery of Quiros in 1606. Cook, having sailed nearly round it, has given a tolerably accurate notion of its figure and extent. It is 22 leagues in length, from N.N.W. to S.S.E., and about half that breadth in its southern part. Its N.W. entrance, *Cape Cumberland* of Cook, is in lat. $14^{\circ} 43'$ S., lon. $166^{\circ} 40'$ E., and its S.W. point, *Cape Lisburne*, is in lat. $15^{\circ} 40'$ S., lon. $166^{\circ} 44'$ E. It rather partakes of the character of an archipelago than a single island, from the numerous islands clustered around its shores.

The accounts of this important island are vague and unsatisfactory. The following is by an observer, who was in the whaling service between 1828 and 1834.

The approach to Espiritu Santo from the eastward is not without its dangers; although the land is high, yet it is not always visible until within a proximity which claims a regard to caution; in the night the high land is generally closely garbed in mist. There are many good harbours to the southward of St. Philip's Bay, situated inside the reefs and islets.

The Espiritu Santo Islands appear to be thickly inhabited. The natives, in many points, appear to differ from those of the other parts of New Hebrides; the language, however, closely resembles that of Mallicollo, Tanna, and the other islands. The outward show of the savages of Espiritu Santo, at a first acquaintance, is that of friendship, the aim to appear quiet and inoffensive; but a more intimate knowledge of their habits and customs contradicts the influence of first impressions. They are deceitful and treacherous, maintaining the character of the Polynesians by their double-facedness; they are strong and athletic, and well supplied with offensive weapons; we believe them the most powerful class of the inhabitants of New Hebrides, and that the voice of their authority is heard by the natives of the other islands. Each valley of Espiritu Santo has its independent chief, who acknowledges no superior; petty warfare consequently exists among the tribes of the island.

The food of the islanders is composed chiefly of the spontaneous productions of their land. We could not discover whether they may be classed with the anthropophagi, but we believe that animal food is interdicted to females, who, instead of filling their appropriate stations, are debased to a condition comparable with that of beasts of burden.

The productions of the island are nearly the same as those of the other islands. They appear to attach great value to turtle-shell, small quantities of which they sometimes possess. The pearl oyster, too, is very abundant at this island, and probably large collections of that article might be made by traders.

Not far from Cape Cumberland (at the northern part of the cluster) are to be seen appearances of several singular antiquities, in the shape of ruined edifices of great size; pillars of regular shape composed of large stones, detached portions of wall, and fragments of cemented masonry, are scattered over a plain of about 3 miles in extent; the mortar with which the stones appear to have been connected resembles chunam.

In a settlement N.E. of Cape Cumberland, about 5 miles distant, are the remains of another edifice similar to the one above described; the natives appear

profoundly ignorant of its design, and the mystical word *tabu* crowns the query of the stranger.*

The learned Mr. Forster, the companion of Cook, thus describes their proceedings :—

“The land which we now saw to the northward seems to be the same which that great navigator, Capt. Quiros, called *Tierra del Espiritu Santo*, and which at that time he supposed to make part of a continent. It is not improbable that the Bay of St. Philip and St. Iago, where he anchored, is situated within the small islands which lie before that great land. We really saw the appearance of a bay within them, but did not stop to examine it, only giving the small islands the name of Bartholomew Isles, from the day on which we saw them.

“We were now entertained once more with the Island of Lepers, and Aurora remained at a great distance to the East. Our course continued to the North along the eastern shore of *Tierra del Espiritu Santo*, where we still discovered new islands, which were not seen by M. Bougainville. These small islands, as well as the main land, had all a very fertile aspect, being covered with fine forests, from whence numerous smokes ascended, which were so many signs of a great population. Having passed the night, standing off and on, we came abreast the northern islands the next morning, and took notice that even the large land extended no farther northward. Most of the small islands were very long, narrow, and bluff at one end, but formed a low flat point, running out to the northward. Their bluff part was commonly white, like a chalk cliff; and it was remarkable that we did not observe any cocoa-nut trees among their forests, which in some places consisted chiefly of club-wood. As we passed by their northern extremity, they formed a very beautiful prospect, gradually opening from each other, and clear of the main land. Steering to the westward we passed a projecting point on *Tierra del Espiritu Santo*, and opened a most spacious bay, of which the entrance could be no less than 5 leagues wide. The depth of the bay was proportioned to the width. The shores on each side seemed to run parallel for the space of 7 leagues, at the end of which the bay terminates. A fine beach was seen all along the bottom of it, and the land from thence, for many leagues within the country, consisted of hills of a very moderate height, and extensive populous valleys, which had the appearance of fertility and plenty. We stood over to its western shore, where we saw many natives, especially towards the evening; and likewise took notice of a canoe, similar to those which we had observed at Mallicollo; it came off, but the people in it kept at a distance from the ship, and would not come near, though we gave them ever so many invitations. The hill which formed the western shore was rather steep, but well inhabited, and covered with woods. A low flat point ran out from it a mile or two into the bay, and formed a kind of cove, where we wished to come to an anchor, as we were becalmed, and the night was coming on. We sounded several times, but found no bottom with 130 and 140 fathoms, about a mile from the shore. A faint breeze here assisted us to get into the middle of the bay, where we waited for daylight, and then continued to stand in to the southward,

* *Sandwich Islands Gazette*, February 10, 1839.

with light airs, which vanished towards noon. Two boats were sent after dinner to the beach, which runs along the bottom of the bay, in order to reconnoitre whether there was any port, or a river, which we could not discern from on board, being still above a league and a half distant. In the meanwhile three canoes put off from the shore, with triangular sails, and approached the ship very fast. In each of them we observed four or five men, to whom we called, so soon as we thought them within hearing. They were naked, and of the same colour as the Mallicollese, but taller and more stoutly formed; their hair seemed to be woolly, and their beards frizzled. They came so near as to accept a present of medals, nails, Taheitee cloth, and red baize; and we could observe them seizing upon the nails with peculiar eagerness, which seems to indicate that they were not unacquainted with them. They fastened a branch of the pepper plant to the same rope by which we had lowered down the nails to them; but it appeared that, besides this emblem of friendship, they had nothing else to give.

“When they saw our boats coming back from the shore, they left us, it being then near sunset; Lieutenant Pickersgill, who had the command, reported that he found no soundings before he came within two or three cables’ length of the shore, but that the bottom was good at this distance. He had found a fine river, which was deep enough for his boat at the entrance, and had landed on one of the banks, whilst a great number of natives appeared in the bushes on the opposite side. He made many signs of friendship, and called and beckoned to them to come over the water; but none of them venturing to accept the invitation, he re-embarked, and returned to the ship. The boats were hoisted in, and a breeze springing up, assisted us to go gradually out of the bay. Capt. Cook gave this bay the name of *St. Philip* and *St. Iago*; but it is still somewhat doubtful whether it is the same which Quiros has distinguished by that name; at least the port of *Vera Cruz*, which, according to that navigator, has room for a thousand ships, is not to be found in it.

“The eastern point of the entrance was named *Cape Quiros*, and lies in lat. $14^{\circ} 55' S$. The western point extends somewhat more to the northward, being in $14^{\circ} 38' S$., and was named *Cape Cumberland*. We were off this point early the next morning, and advanced slowly out of the bay, along the northern coast of the island, being much detained by calms and light airs. Quiros had great reason to extol the beauty and fertility of this country; it is, to appearance, one of the finest in the world.”—(Vol. ii. p. 373.)

From off *Cape Cumberland*, Capt. Cook proceeded to the southward along the western coast. A variety of fish were observed, two albacores caught and a single dolphin. The land was high, the mountains steep, and many fires were observed at night. A southerly breeze springing up, obliged the ship to stand off and on during two days, when she reached the S.W. point of the island, which was named *Cape Lisburne*.*

* Several fish of a most poisonous quality, described by Dr. Forster, were taken by the crew of the *Resolution* at the New Hebrides; and he notices that Quiros, when here, observed that his whole ship’s crew were poisoned at the same place by a fish called *pargo*. The greater part of the fish taken were, however, good and wholesome. Dr. Forster adds, that “the natives seem to be well acquainted with the poisonous quality of the fish; it would be advisable, therefore, to inquire of them whether it may be eaten with safety, and they are everywhere good-natured enough to give fair warning when there is the least danger.”—*Observations*, p. 648.

To the southward of Espiritu Santo are several islands, the largest of which, quite 7 leagues in circumference, was called *Bartholomew Island* by Cook. It is the N.E. point of the channel which Cook called *Bougainville's Strait*, separating it from Mallicollo. The middle of this channel, which is 8 miles broad, is in lat. $15^{\circ} 48' S$.

PIC DE L'ETOILE, or STAR ISLAND, is the northernmost of the New Hebrides. It was thus named by Bougainville in 1768; it is very high, and not above 5 or 6 miles in circumference. Lat. about $14^{\circ} 29' S$, lon. $168^{\circ} 4' E$.

The BANKS ISLANDS, which lie to the northward of the New Hebrides, were discovered by Capt. Bligh, May 14, 1789, during his remarkable voyage in an open boat from Tofoa to Timor, after the mutiny of the *Bounty*. Under the circumstances in which we have gained our knowledge of them, it cannot be remarkable that they are very imperfectly laid down on the charts. "At 6 in the morning we saw land from S.W. by S. to W.N.W., 6 to 8 leagues distant, which soon after appeared to be four islands, one of them much larger than the others, and all of them high and remarkable; at noon we discovered a small island and some rocks, bearing N.W. by N. 4 leagues, and another island, West, 8 leagues, so that the whole were six in number. On the 15th, at one in the morning, another island was discovered, bearing W.N.W. 5 leagues distant. A number of gannets, boobies, and men-of-war birds were seen.

"These islands lie between the latitudes of $13^{\circ} 16'$ and $14^{\circ} 10' S$. Their longitude, according to the reckoning, was between $167^{\circ} 17'$ and $168^{\circ} 34' E$. The largest island I judged to be about 20 leagues in circuit, the others 5 or 6. The easternmost is the smallest island, having a high sugar-loaf hill.

"The sight of these islands served only to increase the misery of our situation. We were very little better than starving, with plenty in view; yet to attempt procuring any relief was attended with so much danger, that prolonging of life, even in the midst of misery, was thought preferable, while there remained hope of being able to surmount our hardships. For my own part, I consider the general run of cloudy and wet weather to be a blessing of Providence. Hot weather would have caused us to die with thirst; and probably being so long constantly covered with rain or sea protected us from that dreadful calamity.

"The islands are fertile and inhabited, as I saw smoke in several places."*

They were so vaguely placed on the charts, that when D'Urville passed them, November 1, 1838, he was much embarrassed.

His first discovery was an isolated rock, which he named *Claire Island*, in lat. $14^{\circ} 20' 45''$, lon. $167^{\circ} 47' 24''$, to the S.W. of the *Sugar-loaf* of Bligh. The latter consists of a uniform land, well wooded, in the middle of which rises a rounded peak, tolerably high and covered with wood. Its form is remarkably round. It terminates to seaward in small low cliffs. No indication of people on it. Its position, according to D'Urville, is lat. $14^{\circ} 52' 45''$, lon. $167^{\circ} 45' 15'' E$.

To the West of it, 1 or 2 leagues distant, is the largest of the group. It is surmounted with very high peaks. At its N.E. point is another smaller isle, less

* Voyage of the *Bounty*, pp. 187-8.

pleasing in its appearance, furnished with wood, but without cocoa-nut trees. The sea beats furiously on its shores, which otherwise appear safe. To the W.N.W. of it is another small high island. Between it and the larger, but much nearer the former, D'Urville saw two small low islets, covered with wood, and of small extent, which had escaped Bligh, but he was disposed to think that they might be the *North Rocks*, as none others were visible in the direction he indicates.*

Capt. R. L. Hunter, of the ship *Marshall Bennett*, passed through the group in December, 1835, and could not reconcile the charts with what he saw. He states that the channel which passed through between two islands ought to be much farther to the southward if the northernmost was the *Banks Islands*.

The southern island was not on the chart (it may therefore be called *Bennett Island*, as the commander's name elsewhere appears). Its North end was in lat. $14^{\circ} 15' S.$, lon. $167^{\circ} 26' E.$ The passage between these two islands is about 16 miles across, with breakers plainly visible on both sides from the mast-head, a very high but small island (Pic de L'Etoile) appearing to the S.E. The island (Bennett Island), which has not been previously seen, or has been omitted, lies due South of Banks Islands (?), distant, as above, about 14 or 16 miles; it is of good height and even appearance, sloping at the sides, and as large as any of the above-named islands, that is, apparently about 30 or 35 miles in circumference, with some inhabitants, several fires being seen. The weather was fine, and the nights clear.†

SANTA CRUZ ISLANDS.

This group of islands was first discovered by Mendaña in 1595, but were not again seen until Carteret re-discovered them in 1767.‡ Still we gained no complete account of them until they were examined by D'Entrecasteaux in 1793. In the Atlas of his voyage, published by M. Rossel, is a good chart of them by M. Beauteups Beaupré. The group is composed of seven larger islands, Vanikoro, Santa Cruz (*Nitendi*), Guerta, Volcano (*Tinakoro*), Edgecumbe, Ourry, and Lord Howe, besides several smaller ones to the N. and N.E. of Volcano Island.

VANIKORO is the southernmost of the Santa Cruz group. It is an important island in the eyes of Europeans, not from its extent or riches, but from its being the scene of the disastrous loss of the two ships of La Pérouse, in 1788, an event which was not ascertained with any certainty until May, 1826, or thirty-eight years afterwards.

Capt. Edwards, in the *Pandora*, who was sent in search of the mutineers of the *Bounty*, was apparently the first who saw Vanikoro, August 13, 1791. He called it *Pitt Island*. On May 19th, 1793, D'Entrecasteaux passed it 12 or 15 leagues to the West, and called it *Ile de la Recherche*, after his ship. This expedition, as is well known, was sent in search of the missing expedition of La Pérouse, and at this time it is believed that some of the survivors were still

* *Voyage de L'Astrolabe et La Zélée*, tome v. pp. 5, 6.

† *Nautical Magazine*, July, 1840, p. 468.

‡ Carteret supposed that he discovered them on August 10, 1767. His crew were in a very bad state from scurvy, and it was with the utmost joy that they hailed the appearance of the land. His first rencontre with the natives, however, was an unfortunate one; his master and three of his best men died from wounds they received in the affray.

living on the scene of their calamity. D'Entrecasteaux thought it much smaller than it is, but fixed its position with great exactness.

Capt. Duperrey, in the *Coquille* (and D'Urville with him on board), passed it in the night of the 1st—2nd August, 1823, but did not examine it.

In May, 1826, Mr. Dillon, who had been much at the Feejee Islands, and had acquired the language, came to Tucopia, and found that his armourer had purchased the silver guard of a sword; there were some unknown cyphers on it, and, on inquiry of Martin Bushart, a Prussian, who had escaped from massacre and being eaten at the Feejees, in 1813, but who had lived at Tucopia ever since, he learnt that at the first of his visits he saw many European articles in the hands of the natives, which he, upon a more intimate acquaintance with the language, found out came from a distant island, named Mannicolo (Vanikoro), and that much more remained there. Other particulars led to the conclusion that these were from the missing expedition. On arriving at Calcutta he stated the circumstances to the Bengal government, and the consequence was, that he was despatched in the *Research*, at the expense of the Honourable Company, 6th of January, 1827, and reached the island in September. Here he made a minute examination of the reefs, and procured a great quantity of articles, guns, iron plates and braces, culinary utensils, a portion of the carving of the stern, broken china, &c., &c., which now form a very interesting trophy in the Galerie de la Marine, in the Louvre, in Paris. He remained here, in Ocili Harbour, from September 13th to October 8th following, and left but little for his successor to gather.

The *Astrolabe*, under the celebrated Dumont D'Urville, anchored at Hobart Town after her voyage, and hearing a vague account of Dillon's discovery, started for Vanikoro, where she anchored February 22, 1828, and quitted it March 17th following, and made a more complete examination of the geography of the island.

The name of the island is open to some remark. Dillon calls it always *Mannicolo*; D'Urville has adopted *Vanikoro*, although Mr. Gaimard, who was with him, says *Vanikolo*. The conversion of the two letters, *l* and *r*, is simple, and not uncommon even among the same natives. Dillon has given almost every point, and by European names. The observations of D'Urville have all been given in the native and more correct names.

It was again visited by D'Urville, in the *Astrolabe* and *Zelée*, in November, 1838, but without adding much to the previous knowledge.

The Vanikoro group has but a very slender population. The coasts alone are inhabited, all the interior being only a dense forest, wild, and nearly impenetrable. Twelve or fifteen hundred was considered to be the outside of the population, according to D'Urville. The indolence of the men, their frequent wars, and the deleterious influence of the climate, unite to daily impoverish this miserable race, so that ere long they may become extinct. Like all others of the black race, they are timid and naturally hostile to Europeans. They are very jealous of their women, who are extremely ugly. The men are in general small, thin, and often attacked with ulcers, or covered with leprous spots. They are active, and sometimes have a pleasing countenance. They generally go naked, except a tapa around the loins. Their food consists of fresh turtle, shell-fish, taro, cocoa-nuts,

bananas, and a kind of sweet potato. There are also two varieties of bread-fruit. Their language is essentially different from that of the Polynesians.

The *climate* of Vanikoro is deadly to Europeans, and does not appear much better to the natives. The density of the forests and the humidity of the soil, kept up by floods of rain, cause this.

The group forming the Vanikoro Islands, or *La Pérouse* as Capt. Dillon styles them, is composed of two, of unequal extent. D'Urville calls the larger of the two *Recherche*, and the smaller *Tevai*. The first is not less than 30 miles in circumference, the other is not more than 9 miles. They are both high, and covered with trees to the water's edge.

Mount Kapogo (or Charles X. of Dillon) is the highest summit of Recherche Island; it is 3000 feet in height, and may be very easily seen at the distance of 20 leagues.

Besides these there are two islets in the inner bay, one of which, moderately high, is called *Manevai* (or *Direction* by Dillon) Island; the other is very low. The small island of *Nanounha* (or *Combermere*), off the North point of the island, or the district of Arambou, is also low. Each of these three islands is at most not more than 1,000 or 1,200 yards in circumference. The whole of these lands are surrounded by an immense reef, 36 miles in circumference, the distance of which from the coasts varies from 1 to 2 miles. With the exception of some narrow passages, it is continuous throughout its whole extent, and is only interrupted in its eastern part for about 8 miles. Besides this, in the space and before the eastern point of Tevai, there is an isolated breaker, which extends more than a mile off. The general reef is formed by beds of compact coral, left dry in parts by the tide, and on which here and there naked blackish rocks rise, varying in height from 4 to 6, and even 8 feet.

Within the reef, and in the space comprised between it and the coast, the depth of water is generally 30 to 35 fathoms; but there are numerous coral patches scattered here and there, which reach within 2 or 3 fathoms of the surface, which renders the navigation embarrassing to ships of any dimensions.

The coast itself is throughout bordered by a reef of coral, which extends 1 or 2 cables' length off, and renders access to it often difficult and dangerous, even to small boats. The *Païou Beach*, at the S.W. side, and a very small space in front of *Ocili* (*Ouscelee*, Dillon) are the only points, according to the examination acquired by D'Urville, which are free, and where canoes can reach the shore.

TEVAI (or *Bayley's Bay*) appears to be the principal bay. It is formed to the North by Vanikoro Island. The mark for entering it is Manevai or Direction Island: a ship ought to bring this island to bear West by compass, and steer for it until the reef of Research Head (to the East of Ocili) is brought to bear South; then haul up S.S.W., and steer for the anchorage, keeping a good look-out for *Deceitful Shoal*, as also for Treacherous or Tytler's Shoal, farther in. There is a channel, Dillon's Passage, between the two islands, so that a ship might pass to the westward in case of necessity. In the narrowest part it is not more than 600 feet broad; and in its centre is a ledge of coral patches, with a passage on either side; that to the South is about 60 feet broad and 4 fathoms deep; that to the North is 90 feet wide, and 3½ fathoms at low water spring tides. The

narrowest part of the North passage is about 120 feet in length, and by buoying it on each side a ship might pass through.

MANEVAI or LUSHINGTON BAY opens to the N.N.E., within the smaller island of Vanikoro; Dillon's Passage affording a communication from Tevai Bay. Its entrance, called by Dillon *Haye's Channel*, through the reef, lies nearly true North from Direction Island. The narrowest part is at its inside, leading into the bay, where it is from a quarter to half a mile broad. The weather or eastern reef, which forms that side of the channel, runs out N.E.; under its lee is smooth water. The lee or West reef runs out to the N.W. From the direction the reefs take there is a large space between them, in which no dangers could be discovered. Between the narrowest part of this channel and *Cape Hayes*, the N.W. point of Manevai Bay, there are five coral patches, of 1 to 2½ fathoms. They are easily avoided, and are best kept to port by vessels proceeding to sea.—(Capt. Dillon, vol. ii. pp. 261-2.)

The spot where the unfortunate ships were wrecked is at the S.W. part of the island, and on the outer reef, opposite the district of Payou or Païou, one of the ships (the *Boussole*) was wrecked, her remains having been seen and collected, both by Dillon in 1827, and by D'Urville in the following year.* Dillon thus describes it:—"The district of Païou is a low level island, extending along the coast in an East and West direction. The plain extends inland 2 or 3 miles, and is thickly covered with wood, except a *small clear spot*. Some of the trees are enormously large. Through this place there runs a small river, into which the tide flows. The clear spot of ground is about one square acre in extent, fronted on the South by the sea, on the East by the river, and on the North and West by woods. It is the best-adapted place on the island either to build or launch a vessel at, there being no rocks in the vicinity of the shore, and the banks of the rivulet abounding with timber." Here he was informed that the survivors built and launched their brig. This cleared spot is manifestly artificial, and every evidence tends to confirm the truth of this. There are several passages through the reef in this part.

It will be unimportant to follow the minute description of the reefs, passages, and points of Vanikoro scattered through the second volume of Dillon's work, because in themselves they can only afford interest from the sad event with which the island is connected.

TOPOUA is the next island to the northward. Carteret calls it *Ourry* and *New Alderney*, but the discordant particulars recorded of it are not worth

* Dillon says that the weather side of the island is called Manicolo (Vanikoro), and the western side Whannow or Whanoo. The natives told him that one of the ships anchored at Whanoo, and the other at Païou a little distance from one another. Some time after they anchored, a heavy gale arose, and both vessels were driven ashore: that anchored off Whanoo grounded on the rocks, and the wreck being complete, the crew were attacked by the natives, and every soul murdered. The other grounded on a sandy beach, and the natives also came down and shot their arrows into her; but the crew prudently did not resent it. An aged man then went ashore in a boat, and opened a friendly intercourse. The natives supplied them with provisions, and they landed and remained for some time, and built a small vessel from the wreck of the large one. When ready to sail as many as could embarked, being plentifully supplied with provisions. Those who were left distributed themselves among the chiefs, being useful by the muskets and powder they possessed, and resided there till all were dead. See Capt. Dillon's Letter to the Secretary of the Bengal Government, vol. i. p. 37.

repeating here. Capt. D'Urville places the western summit of it in lat. $11^{\circ} 17' 30''$, lon. $166^{\circ} 32' 14''$ E.

NITENDI, or SANTA CRUZ ISLAND, is the principal of the group; it was thus named by Mendaña, but it is probable that he thus designated the entire group, for Quiros calls it, for distinction, *La Isla Granda de Santa Cruz*. Its length is 20 miles, in a direction nearly East and West, and its breadth about half as much. Carteret sailed along its northern side, and D'Entrecasteaux on its southern coast. They are both thickly peopled; but the natives are the most cruel in the Pacific. Besides this, as the island does not offer any safe harbour, and as Carteret and D'Entrecasteaux state there is but little to be got in the way of necessaries for ships, it does not appear to be a very desirable point to come for refreshment.

Cape Byron, the N.E. point of the island, according to the observations of D'Entrecasteaux, is in lat. $10^{\circ} 41' S.$, lon. $166^{\circ} 4' 30''$, and *Cape Boscawen*, its S.W. point, in lat. $10^{\circ} 51' 15''$, and lon. $165^{\circ} 43' 15''$. The bay, called by Carteret *Trevanion Lagoon*, and which lies on the N.W. part of the island, is the same in which Mendaña anchored the second time, and which he called *Port Graciosa*. Carteret made no survey of it, but, according to all appearance, it is in many respects preferable to any other on the North side of the island. There is only one doubtful feature, according to Carteret, that is, whether the bottom is good holding ground; but, as before mentioned, Mendaña anchored in it. The entrance is more than 2 miles broad. In front of the bay, at the distance of a mile, is an island named by Mendaña *Guerta Island*, and by Carteret, *Trevanion Island*. It is nearly 10 miles in circuit. Its North part is in lat. $10^{\circ} 40' S.$, lon. $165^{\circ} 45' 30''$.

Near to Cape Byron is *Port Swallow*, where Carteret anchored. He says that it is 7 miles from the cape; but as he states the island is three times the length that D'Entrecasteaux assigns to it, it must be supposed that this distance is overrated.

Bloody Bay is also on the North coast, and to the West of Port Swallow. It acquired its name because Carteret's pilot and several of his crew were surprised and massacred by the natives. Between Bloody Bay and Port Swallow is *Byron Bay*. Carteret says "it is a fine round harbour." Good water may be got in it, but it will not hold more than three vessels. Both Carteret and D'Entrecasteaux experienced a strong current to the West, near the land.

The land of Nitendi, says D'Urville, appeared to be moderately high on its eastern part, much less so in the western; it is covered with wood from the water's edge to the summit of the mountains.

TINAKORO, or VOLCANO ISLAND, as it is called both by Mendaña and Carteret, is a tolerably high cone, falling into the sea by a rapid slope. The lower portion, about one-third, is covered with a vegetation apparently most luxuriant nearest the sea. The upper part is entirely barren. No traces of inhabitants in any part. Smoke and flame were seen to be emitted from its summit, and on its S.W. side incandescent lava was seen flowing down.* It is in lat. $10^{\circ} 23' 10'' S.$, lon. $165^{\circ} 49' 34'' E.$

* Voyage de *L'Astrolabe* et *Zélée*, tome v. p. 15.

The islands to the N.E. of Tinakoro are very imperfectly described, therefore we have but little here to add to the information conveyed by the charts. The following must suffice:—From Duff's Group, Capt. Wilson proceeded W. by S. 13 or 14 leagues; and, on the following day, observed in lat. $10^{\circ} 4'$ S. They were "then just losing sight of the easternmost of the group, bearing about E. 13° N., when we again saw land in the S.W. quarter, and steered for it, which proved to be Swallow Island and Volcano Island; and, farther to the S.W., we could discern *Santa Cruz*; all these were seen by Capt. Carteret. Besides these we discovered a low island, which lies about S.S.W. from Volcano Island, and steered to go between the two latter, but found that a reef ran from the South part of the low island; to avoid which we hauled to the southward, then bore away, and, steering W. by S. about 5 leagues, saw two more low islands, bearing about W. by N., distant 2 or 3 miles. As the moon was just now setting, and we had reason to think running in the dark would be extremely dangerous, we hove-to, with the ship's head towards Volcano Island. Capt. Carteret, in his narrative, says that they saw smoke, but no flame, issuing from this volcano; but, as we passed it closely, and even when we were at a distance, we beheld it emitting a large and bright flame every ten minutes, which was to me and many on board truly gratifying, who had never before beheld so grand a phenomenon. The height of this volcano is, from the surface of the sea, 2,000 feet and upwards; and its height is to its base in the proportion of one to three; its circular form, with straight sides and an apparently pointed top, gave us reason to suppose that it had received this form by successive eruptions of lava issuing from the crater, and running down its sides; and, perhaps, if this ever was what naturalists call a primitive mountain, it might not originally be very high; its being surrounded by low islands, and its similar form to any common heap of matter, naturally enough suggest such an idea."*

MENDAÑA or DUFF'S GROUP was discovered by Quiros and Torres, 1606, who gave the name *Taumaco* to the principal island, but they do not appear to have given a name to the group collectively. The islands were again seen at 8 A.M., 25th September, 1797, by the ship *Duff*, Capt. James Wilson: "at about 5 P.M. we approached the land, and found that it consisted of ten or eleven separate islands, two or three of which were of considerable size, and saw a canoe coming off, in which were two men. About 11 A.M. on the following day, we were pretty near to the largest island, when five canoes ventured off, but acted with the same caution as before, taking great care to keep between us and the shore, to which they paddled after about an hour's stay. Seeing them depart, we stood close in with a reef, which lies about half a mile from the beach, and seems to extend some distance from the West end; and, probably, the islands are connected by it. Where we were (off the South side) we found 7 fathoms, a flat coral bottom.

"The largest of this group (*Taumaco*), we named *Disappointment Island*, and the whole cluster, Duff's Group: they are about eleven in number, lying in a direction S.E. and N.W., 14 or 15 miles. In the middle are two larger islands,

* Missionary Voyage, p. 292.

about 6 miles in circumference; betwixt these last is a small islet, and to the eastward are three islets, two of which are round and high, the other flat and longish. On the N.W. part of the group are five or six more, some of them high. At the East end of one is a remarkable rock, in the form of an obelisk. The small islands are apparently barren, but the two largest are entirely covered with wood, among which were several cocoa-nut trees, but, on the whole, they had not the appearance of great fertility. The natives appeared stout and well made, with copper-coloured complexions; their houses are built close to each other, and not dispersed, as we had been accustomed to see them: a horde of their dwellings was on the S.W. side of Disappointment Island. The latitude of the latter is $9^{\circ} 57' S.$, and the longitude $167^{\circ} 0' E.$ ”*

To the North of the Feejee Archipelago, and the eastward of the New Hebrides, lie a number of scattered islets and shoals, which remain to be described to complete the list of those between latitudes 10° and $20^{\circ} S.$, and which do not belong to either of the large archipelagoes which we have just described.

The BAYONNAISE BANK was found by Capt. Tromelin, May 24, 1828. His soundings were 16 fathoms, coral bottom; after running 2 miles from his first cast, the bottom could not be reached. Lat. $12^{\circ} 8' 30'' S.$, lon. $180^{\circ} 16' 30'' E.$

MEEK SHOAL, a coral reef seen by Mr. John Meek, of the ship *Sir James Cockburn*, of London, in 1832. No breakers. Lat. $10^{\circ} 40' S.$, lon. $179^{\circ} 8' E.$

ROTUMAH, ROTUAM, or GRENVILLE ISLAND, was discovered by Capt. Edwards, in his search for the mutineers of the *Bounty* in 1791. It has been visited by Capts. Duperrey and Chramtschenko. According to the former, it is about 4 or 5 miles in extent, from N. to S.† The South end terminates in a low point, at the end of which a conical hill rises, which seems to form a separate islet. Two islets, one of which is very flat, lie 2 miles from the North end. *Atangota Island*, near the East point of the island, according to Duperrey, is in lat. $12^{\circ} 32' S.$, lon. $177^{\circ} 13' E.$ ‡

M. Dutailis says that the island is called by the natives Rotuam, and has two roadsteads in its northern part, equally good or bad according to the season. That of *Oinaft* was for a long time the only one used, and still has the greatest number of ships to visit it, because this village is the residence of the king and chiefs of the conquering party; but more provisions may be found in the *Bay of Fao*, where you may water as in the first, by the assistance of the natives.

The village of *Maftoa* is tenanted by a chief belonging to the conquering party, and very intelligent. He has always seemed disposed to take the part of the Europeans, and particularly of the missionaries.

* Missionary Voyage, p. 291.

† Mr. Bennett says it is 10 or 12 leagues in circumference.—*United Service Journal*, June, 1831.

‡ M. Lesson, in the *Nouvelles Annales des Voyages*.

The tongue of land which unites the two islands has not been formed for any great length of time, for the natives still speak of the "two islands."

The shore is covered with villages touching each other, and the population is very numerous.

Itououtou is the residence of the superior of the mission. In the season of the northerly winds you may anchor on the coral patches lying in front of the village, and on which there is a depth of 7 to 11 fathoms.

On the tongue of land which forms the southern part of the Bay of Fao is the second establishment of the missionaries.*

The longitude of Capt. Chramtschenko does not agree well with that of Duperrey. He makes the middle of the island to be in $176^{\circ} 54'$, by means of lunars and chronometers.

EAGLESTON REEF.—At 40 miles East of Rotuma is a shoal of unknown extent; the information respecting it was given to Mr. Forbes, of H.M.S. *Hyacinth*, by Capt. Eagleston, of the American ship *Salem*.† This would be in about lat. $12^{\circ} 30' S.$, lon. $178^{\circ} 0' E.$

ISABELLA SHOAL, discovered by Mr. John Pearson, of the American ship *Isabella*, February 20, 1832, with a depth of 16 fathoms, coral bottom, is in lat. $12^{\circ} 25' S.$, lon. $177^{\circ} 15' W.$ It extended East and West as far as the eye could reach.

A REEF, in lat. $15^{\circ} 32' S.$, and lon. $175^{\circ} 20' E.$, according to Capt. Hamond, H.M.S. *Salamander*.‡

ONASEUSE (or HUNTER) ISLAND was discovered July 20, 1823, by Capt. Hunter, in the ship *Dona Carmelita*. Its extent is not stated, but it is well peopled and well cultivated. It is of volcanic origin, and Capt. Hunter procured a quantity of yams, fruit, and some hogs. The natives were friendly, and all had the left finger cut off at the second joint, and their cheeks perforated; spears 24 to 40 feet long. Lat. $15^{\circ} 31' S.$, lon. $176^{\circ} 11' E.$

CARTER'S REEF is stated to be in lat. $15^{\circ} 42' S.$, lon. $176^{\circ} 28' E.$

Another REEF, in lat. $18^{\circ} 10' S.$, lon. $175^{\circ} 10' E.$

CHARLOTTE BANK and PANDORA REEF.—The English vessels *Scarborough* and *Alexander* discovered, June 4, 1788, a bank, on which the lead gave 15 fathoms. It extended far to the West, where there was probably an island, for a great quantity of birds took their flight towards that direction. Admiral Krusenstern places this bank, the Charlotte Bank, in lat. $11^{\circ} 50' S.$, and lon. $173^{\circ} 12' E.$ The *Pandora* frigate discovered a reef in lat. $12^{\circ} 11' S.$, and lon.

* M. Dutailly, Ann. Hyd., 1850, vol. 1. p. 153; see also Krusenstern, Supp. p. 8.

† Nautical Magazine, February, 1836, p. 66, and November, 1848, p. 574.

‡ Nautical Magazine, 1847, p. 379.

172° 7' E. It is not unlikely but that these two may join, like many other of the reefs of these seas which are not isolated reefs, but composed of numerous separated portions. It may also be supposed that the birds might have been taking their course toward the latter reef.*

MITRE ISLAND, or FATAKA, was discovered by Capt. Edwards, and has been also visited by the Russian captain, Kroutcheff, in 1822, who describes it as being 2 miles long, N.W. and S.E. It is steep, covered with wood, and consists of two hills and a rock, giving it the appearance of a mitre. Capt. Goodwyn says, that when seen from the eastward it appears like two separate haycocks, both of the same apparent height, but the one to the southward more rugged than the other. It is bare of vegetation. Capt. Kroutcheff places its S.E. point in lat. 11° 56' S., and lon. 170° 20' E., and says it is uninhabited.

ANNULA, or CHERRY ISLAND, according to the same authority, is in lat. 11° 35' S., and lon. 170° 0' E. Capt. Edwards places it in lat. 11° 37', and lon. 169° 40' 30'. It is lower than Mitre Island, and is 3 miles from N.E. to S.W. At the distance of a mile from its southern end is a rock, which is joined to the island by a rocky bank, and a similar bank runs off its northern part.

TUCOPIA, or BARWELL ISLAND, it is supposed was discovered by Quiros, and derives its second name from the vessel which next saw it, in 1798. It has subsequently been visited by Capt. Golownin, and also by Capt. Tromelin, in 1828, and still later by Dillon and D'Urville. It is a small island, of 3 miles in diameter, in lat. 12° 21' 10' S., and lon. 168° 43' 30' E., according to Tromelin.

It was supposed that all these three last-named islands did not exist, two or more being identical with each other; but they have all been visited, and their positions fixed as above.†

Tucopia is small and high, in the form of a compressed cone, with precipitous cliffs round the East side, and some lofty trees thinly scattered on the ridge at the southern extremity. When it bears South the island assumes the shape of a saddle; the N.E. end, much the highest, extends longitudinally to the S.W. Its altitude is computed to be 3,000 feet.‡

Tucopia, or as it is called by D'Urville, *Tikopia*, is somewhat triangular in shape, and may be 7 miles in circumference; from the East to the West points about 2 miles; from the S.W. to the N.W. points from 1½ to 2 miles; the other side, between the East point and the N.W. point, about 3 miles. It can be approached with safety all round, is of considerable height, and may be seen at the distance of 40 miles in clear weather. Supplies of all kinds, such as yams, cocoa-nuts, &c., are scarce and dear. A ship may anchor with the point of the reef which lies off the S.W. part of the island bearing S. by W., the N.W. part of the island bearing N.E. ½ E., and the landing place or bluff head bearing

* Krusenstern, vol. i. p. 22, and Supplement, p. 8.

† Krusenstern, vol. i. pp. 21, 199; vol. ii. p. 431; Supplement, p. 7; and Nautical Magazine, July, 1841, p. 449.

‡ Notes on Society in New South Wales in 1832, &c., by A. Osborne.

E. by S., in 27 fathoms, 2 cables' length off shore, bottom of coarse sand and shells. Immediately outside of these are from 50 to 100 fathoms.* The inhabitants do not exceed 400 or 500 in number.

It was on Tucopia that the remains of the expedition of La Pérouse—the sword-bilt, &c., were found, which led to the discovery of the site and particulars of the wreck (see page 956).

CHAPTER XXVIII.

GALAPAGOS ISLANDS.

THE Galāpāgos Islands are a group lying on the equator, extending $1\frac{1}{2}^{\circ}$ on each side of it, and about 600 miles from the West coast of the republic of Ecuador, to which they belong.

Dampier, who visited them in May, 1684, says:†—"The *Spaniards*, when they first discovered these islands, found multitudes of guanoes (iguanas) and land-turtle or tortoise, and named them the *Galapagos* Islands. I do believe there is no place in the world that is so plentifully stored with those animals. The guanoes here are fat and large as any that I ever saw; they are so tame that a man may knock down twenty in an hour's time with a club. The land-turtle are here so numerous, that 500 or 600 men might subsist on them alone for several months, without any other sort of provision; they are extraordinarily large and fat, and so sweet, that no pullet eats more pleasantly."‡

The surveys of Capt. FitzRoy, in the *Beagle*, have given us a very accurate knowledge of their condition; and therefore from his description, combined with the interesting observations of Mr. Darwin, we chiefly derive the following:—

There are six principal islands, nine smaller, and many islets, scarcely deserving

* Dillon's Voyage, vol. ii. p. 129; see also D'Urville, Voyage de *L'Astrolabe*, vol. v. p. 198, *et seq.*

† His description of them appears to require some modification in the present day. Perhaps they may have slightly changed their character. "They are of a good height, most of them are flat and even on the top; four or five of the easternmost are rocky, barren, and hilly, producing neither tree, herb, nor grass, but a few dildo trees (cacti), except by the sea-side. . . . There is water on these barren islands, in ponds and holes among the rocks. . . . Some of the westernmost of these islands are 9 or 10 leagues long, and 6 or 7 broad; the mould deep and black. These produce trees of great and tall bodies, especially mammees trees, which grow here in great groves." The barrenness is only applicable to the western islands, where the volcanic forces are in frequent activity. See Darwin, p. 456.

‡ A New Voyage Round the World, by Capt. William Dampier, vol. i. pp. 102-3. The name *Galāpāgos* is derived from the tortoise or land-turtle, which abounds on them, this word being the Spanish for these reptiles, the *testudo indicus* of naturalists. The accent is on the second syllable, as above written, and not as would be pronounced from Dampier's, Colnett's, and other authors' erroneous orthography. Many most interesting particulars of the habits and formation of these animals are given in Mr. Darwin's excellent work, which should be a portion of every seaman's library in the Pacific (pp. 462-466). Capt. Basil Hall, who, as mentioned hereafter, visited these islands in 1821, quotes the following in his entertaining journal:—"The most accu-

to be distinguished from mere rocks. The largest island, Albemarle, is 60 miles in length and about 15 miles broad, the highest part being 4,700 feet above the level of the sea.

The constitution of the whole is volcanic. With the exception of some ejected fragments of granite, which have been most curiously glazed and altered by the heat, every part consists of lava, or of sandstone, resulting from the attrition of such materials. The higher islands, generally, have one or more principal craters towards their centre, and on their flanks smaller orifices. Mr. Darwin affirms that there must be, in all the islands of the archipelago, at least 2,000 craters.

These are of two kinds; one, as in ordinary cases, consisting of scorice and lava, the other of finely-stratified volcanic sandstone. The latter, in most instances, have a form beautifully symmetrical; their origin is due to the ejection of mud, that is, fine volcanic ashes and water, without any lava. Considering that these islands are placed directly under the equator, the climate is far from being excessively hot; a circumstance which, perhaps, is chiefly owing to the singularly low temperature of the surrounding sea. Excepting during one short season, very little rain falls, and even then it is not regular; but the

rate and full account of these curious animals which I have anywhere seen is contained in a very amusing book, Delano's *Voyages and Travels*, printed at Boston, in 1807. From the fidelity with which such of their habits as we had an opportunity of observing are described, I am satisfied with the correctness of the whole picture. We took some on board, which lived for many months, but none of them survived the cold weather off Cape Horn. I preserved one in a cask of spirits, and it may now be seen in the museum of the college at Edinburgh: it is about the medium size." Capt. Delano says:—"The terrapin, or as it is sometimes called, the land-tortoise, that is found at the Galapagos Islands, is by far the largest, best, and most numerous, of any place I ever visited. Some of the largest weigh three or four hundred pounds; but their common size is between fifty and one hundred pounds. Their shape is somewhat similar to that of our small land-tortoise which is found upon the upland, and is, like it, high and round on the back. They have a very long neck, which, together with their head, has a disagreeable appearance, very much resembling a large serpent. I have seen them with necks between two and three feet long, and when they saw anything that was new to them, or met each other, they would raise their heads as high as they could, their necks being nearly vertical, and advance with their mouths wide open, appearing to be the most spiteful of any reptile whatever. Sometimes two of them would come up to each other in that manner, so near as almost to touch, and stand in that position for two or three minutes, appearing so angry, that their mouths, heads, and necks, appeared to quiver with passion, when, by the least touch of a stick against their heads or necks, they would shrink back in an instant, and draw their necks, heads, and legs into their shells. This is the only quick motion I ever saw them perform. I was put in the same kind of fear that is felt at the sight or near approach of a snake, at the first one I saw, which was very large. I was alone at the time, and he stretched himself as high as he could, opened his mouth, and advanced towards me. His body was raised more than a foot from the ground, his head turned forward in the manner of a snake in the act of biting, and raised two feet and a half above its body. I had a musket in my hand at the time, and when he advanced near enough to reach him with it, I held the muzzle out so that he hit his neck against it, at the touch of which he dropped himself upon the ground, and instantly secured all his limbs within his shell. They are perfectly harmless, as much so as any animal I know of, notwithstanding their threatening appearance. They have no teeth, and of course they cannot bite very hard. They take their food into their mouths by the assistance of the sharp edge of the upper and under jaw, which shut together, one a little within the other, so as to nip grass, or any flowers, berries, or shrubbery, the only food they eat.

"Those who have seen the elephant have seen the exact resemblance of the leg and foot of a terrapin. I have thought that I could discover some faint resemblance to that animal in sagacity. They are very prudent in taking care of themselves and their eggs, and in the manner of securing them in their nests; and I have observed on board my own ship, as well as others, that they can easily be taught to go to any place on the deck, which may be wished for them to be constantly kept in. The method to effect this is, by whipping them with a small line when they are out of place, and to take them up and carry them to the place assigned for them; which, being repeated a

clouds generally hang low. From these circumstances, the lower parts of the islands are extremely arid, whilst the summits, at an elevation of 1,000 feet, or more, possess a tolerably luxuriant vegetation. This is especially the case on the windward side, which first receives and condenses the moisture from the atmosphere. Dampier also states:—"The air of these islands is temperate enough considering the clime. Here is constantly a fresh sea-breeze all day, and cooling refreshing winds in the night; therefore the heat is not so violent here as in most places near the equator. The time of the year for the rains is in *November, December, and January*, then there is oftentimes excessive hard tempestuous weather, mixed with much thunder and lightning. Sometimes before and after these months there are moderate refreshing showers; but in *May, June, July, and August*, the weather is always very fair."*—(Vol. i. p. 108.) Capt. FitzRoy says:—"I can add nothing to this excellent description, except that heavy rollers occasionally break upon the northern shores of the Galapagos, during the rainy season above mentioned, though no wind of any consequence accompanies them. They are caused by the 'Northers' or 'Papagayos,' which are so well known on the coast between Panamá and Acapulco."—(P. 502.)

few times, will bring them into the practice of going themselves, by being whipped when they are out of their place. They can be taught to eat on board a ship, as well as a sheep or a goat; and will live for a long time if there is proper food provided for them. This I always took care to do, when in a place where I could procure it. The most suitable to take on board a ship is prickly-pear trees; the trunk of which is a soft, pithy substance, of a sweetish taste, and full of juice. Sometimes I procured grass for them. Either of these being strewed on the quarter-deck, the pear tree being cut fine, would immediately entice them to come from all parts of the deck to it; and they would eat in their way as well as any domestic animal. I have known them live several months without food; but they always, in that case, grow lighter, and their fat diminishes, as common sense teaches, notwithstanding some writers have asserted to the contrary. If food will fatten animals, to go without it will make them lean.

"I carried at one time from James's Island three hundred very good terrapins to the Island of Massa Fuero; and there landed more than half of them, after having them sixty days on board my ship. Half of the number landed died as soon as they took food. This was owing to their stomachs having got so weak and out of tone that they could not digest it. As soon as they ate any grass after landing, they would froth at the mouth, and appeared to be in a state of insanity, and died in the course of a day or two. This satisfied me that they were in some sort like other animals, and only differed from them by being slower in their motions; and that it takes a longer time to produce an effect upon their system than upon that of other creatures. Those that survived the shock which was occasioned by this sudden transition from total abstinence to that of abundance, soon became tranquil, and appeared to be as healthy and as contented with the climate as when they were at their native place; and they would probably have lived as long, had they not been killed for food. Their flesh, without exception, is of as sweet and pleasant a flavour as any that I ever ate. It was common to take out of one of them ten or twelve pounds of fat when they were opened, besides what was necessary to cook them with. This was as yellow as our best butter, and of a sweeter flavour than hog's lard. They are the slowest in their motions of any animal I ever saw, except the sloth. They are remarkable for their strength; one of them would bear a man's weight on his back and walk with him. I have seen them at one or two other places only. One instance was, those brought from Madagascar to the Isle of France; but they were far inferior in size, had longer legs, and were much more ugly in their looks, than those of the Galapagos Islands. I think I have likewise seen them at some of the Oriental Islands which I have visited."

One very singular point connected with them is, that on the different islands of the group, these animals are different from each other, so that the settlers can at once tell from what island any one is brought. This is another notable feature. Mr. Darwin remarks:—"The natural history of this archipelago is very remarkable; it seems to be a little world in itself; the greater number of its inhabitants, both vegetable and animal, being found nowhere else."—Pp. 454, 465. This subject is shown clearly in the *second* edition of this gentleman's work.

* During the rainy season, or from November to March (which is not, however, at all to be compared to a continental rainy season), there are calms, variable breezes, and sometimes westerly winds, though the latter are neither of long duration nor frequent.—*Capt. FitzRoy.*

CURRENTS.—One thing for which the vicinity of this archipelago may be distinguished, is the remarkable currents which surround them; and, as before mentioned, may have considerable influence on their climate.* There seems to be a great similarity in this respect between the Galapagos and the Islands of Fernando Po, Princes, and Anno Bon, in the Bight of Benin. Both series are somewhat similarly situated (and perhaps physically constituted) in reference to the general systems of winds and currents, and both are notable for the strength and velocity of the surrounding streams. Around the Galapagos they usually run to the N.W., and with the velocity of from 2 to 5 miles per hour. But these are not probably very constant in their position or direction, for streams of different velocity, direction, and temperature, traverse in contrary directions the prevalent current. The difference in temperature, indicative of the origin of these different veins of water, is remarkable. On one side of Albemarle Island Capt. FitzRoy found the temperature of the sea, a foot below the surface, 80° Fah., but at the other side it was less than 60°, evidently showing that one was owing to the cold current, perhaps coming from the southward, along the Peruvian and Chilian coasts, and the other coming from the coasts of Mexico and Panamá. But upon this important subject we shall reserve the observations for the section devoted for that purpose.

The islands belong, as before stated, to the republic of Ecuador, of which they form a department. In 1832, Don José Villamil (or Willimi), a native of Louisiana, considering himself ill-treated by the executive of that republic, in the army of which he served in the rank of colonel, left their service, and bought two of the most southern of the group, of which one was Charles Island. He then obtained permission from the president of the republic to found on it, at his own expense, a colony of free men and women, selected from the prisons and profligacy of Guayaquil. These he employed in cultivation, fishery, &c., and he called his colony on Charles Island, *La Floriania* (or *Floriade*), in compliment to General Flores.†

At the time of the *Beagle's* visit, in September, 1835, the settlement, near Black Beach Road, on the N.W. side, consisted of about eighty small houses or huts, and nearly two hundred souls upon the island, most of whom were convicts. The houses are in a fertile space on the upland, but the climate is here very damp. It cannot be seen by a vessel running past, being situated about 5 miles inland, between two of the highest mountains. This is the only permanent settlement on the group, which is of considerable importance to the shipping in the Pacific who frequent the islands for supplies, turtle or terrapin, fuel and water.

Admiral Sir George Seymour says (1849), that the number of settlers is now reduced to about twenty-five, as the greater number have left the island, their chief occupation of supplying the whaling-ships having ceased with the exhaustion

* Colnett was disposed to believe that these islands were the general rendezvous of the spermaceti whales from the coasts of Peru, Mexico, and the Gulf of Panamá, who came there to calve. Young spermaceti whales were seen in great numbers. This was in April, 1794. See p. 147. The singular nature of the currents may bear upon this subject.

† *Annales Maritimes*, 1837.

of the terrapin on the island. On the lately cultivated farms every kind of tropical production was growing in abundance; and the adjoining lands, which had not been cleared, appeared to be of the same character, and to be available for increased means of subsistence if the island were peopled.—(Journal of the Royal Geographical Society, 1849, p. 22.)

ALBEMARLE ISLAND is the principal of the group, and is to the westward. The survey of Capt. FitzRoy exhibits every feature of it. It is a singular mass of volcanic ejections. Six volcanoes have there raised their summits from 2,000 to 4,000 feet above the ocean, and from them immense quantities of lava have from time to time flowed towards the sea; so that this island, large as it is, may be literally described by saying that it consists of six huge craters, whose bases are united by their own overflowed lava. The southern side, which is exposed to the trade wind, and completely intercepts it, with all the clouds it brings, is thickly wooded, very green, and doubtless has fresh water; but how is that water to be obtained when such a swell rolls upon the shore?

Four small islets, the remains of volcanoes, lie near the low S.E. extreme of this island, which, with *Brattle Islet*, are extremely useful in warning vessels of their approach to a very dangerous piece of coast. So low are the south-eastern extremities of Albemarle Island, that they are not discernible until you see the surf on the shore. A heavy swell setting towards the land, and generally light winds, add to the danger of getting near this coast; but there is anchorage in case of necessity.

Point Essex is the S.W. cape; it is high, and to the North of it is *Iguana Cove*, in which the *Beagle* anchored. "It is a small cove; but such a wild-looking place—with such quantities of hideous iguanas as were quite startling. Passing a low projecting point (called by the bucaniers *Christopher's Point*), our eyes and imagination were engrossed by the strange wildness of the view; for in such a place Vulcan might have worked. Amidst the most confusedly heaped masses of lava, black and barren, as if hardly yet cooled, innumerable craters (or fumeroles) showed their very regular, even artificial-looking heaps—like immense iron works, on a Cyclopean scale.

"When this lava flowed from the heights, it must have been stopped rather suddenly (cooled) by the water; for the lava cliffs are in some places 20, and in others 40 feet high, while close to them there is water so deep that a ship could not anchor there, even in a calm, while the sea is quite smooth."*

Elizabeth Bay, which received its name from the bucaniers, is a very extensive bay between the South side of Narborough Island and the southern part of Albemarle Island. At the bottom of it is *Perry Isthmus*, which is the low junction between the higher southern and northern portions of Albemarle Island.

NARBOROUGH ISLAND, which forms the North side of Elizabeth Bay, is exactly like a part of Albemarle—a great volcano, whose base is surrounded by an extensive field of lava; it is utterly barren and desolate. A few mangroves on the sandy beaches near Albemarle Island are not seen in the distance; neither

* FitzRoy, p. 494, and Colnett, p. 143.

are there enough of them even to diminish the dismal appearance of the island. Colnett says that it is the highest land among the Galapagos; the apparent point of division between it and Albemarle is so low in both that he was in doubt whether they were separated.*

Tagus Cove lies in the North part of the strait separating Albemarle from Narborough Island. It was first described by Capt. Pípon, who commanded H.M.S. *Tagus*. It is the crater of an extinct volcano, and its sides are so steep as to be almost inaccessible.† Capt. FitzRoy could only find a few holes containing fresh water here, frequented by flocks of little birds, a sure sign of its scarcity; yet during the rainy season there must be considerable streams, judging by gullies worn in the rock. Numbers of black and red (or brown) iguanas may be taken. Here and there are sandy beaches, by which numbers of turtle gain the land. From an adjoining height the view is dismal indeed, but deeply interesting.‡

Capt. Pípon's description is as follows:—"It is situated in the narrowest part of the passage between these two islands, and is not easily seen from the narrowness of its entrance; it is indeed altogether in point of size inconsiderable, and lays between two high lands; it is steep to all round, having no less than 6 fathoms water close to the shore. The soundings, as you enter, decrease from 24 to 20, 18, 16, 14, 12, 10, and 6 fathoms. There are no dangers whatever in entering, and if the breeze fails, you may tow in with your boats, and anchor in any part. The shore round it is so steep as to be almost inaccessible. The best method of steadying your ship is with a hawser fast to the shore, having first come to with a bower anchor. You may ride in this cove with the greatest safety, and I imagine it is capable of containing at least six frigates. It is not more than 3 cables' length wide, and not quite a mile in length. We weighed at daylight in the morning of the 5th of August, and found no difficulty in warping and turning out. In working to windward, between Albemarle and Narborough Islands, we were much baffled with light and variable winds, which were succeeded frequently by calms. As we passed this latter island, we observed two craters burning, and the lava running down even to the water's edge. The channel, in the narrowest part, is not more than 3 miles wide, and the shores to the southward on both sides generally rugged, though I apprehend there are no dangers but what show themselves above water."

Banks Bay, so named by Colnett in honour of Sir Joseph Banks, lies to the northward of Narborough Island. Its North point, which is the N.W. point of Albemarle, was named by Colnett *Cape Berkeley*. The western side of

* Colnett, p. 146. † Lord Byron anchored here in H.M.S. *Blonde*, in 1825; Supp. 92—94.

‡ The volcanoes of the Galapagos will appear sufficiently remarkable from what has been previously stated. We have but few notices of any of those grand displays of volcanic agency which must have acted so powerfully here. Capt. Morrell anchored in *Tagus Cove* in February, 1825, when a terrific eruption occurred in Narborough Island. His description certainly is calculated to convey a very lofty impression of the terrible magnificence of the spectacle. He says that he was obliged to run from his anchorage to escape the fury of the fires, making his way to the southward, the temperature being sometimes in the air at 147°, and in the water at 150° (!) This was occasioned by the rivers of molten lava of dazzling brightness running down the steep sides of the mountain, and pouring into the sea, with terrific noise and ebullition (pp. 192—194). Capt. FitzRoy saw smoke, but no flame, issuing from several places near the summit of the S.E. volcano of Albemarle.

Narborough Island is very steep-to, no bottom being found with 150 fathoms of line at half a mile from the shore. There appears to be no anchorage near this or Cape Berkeley.

The northern point of Albemarle Island is *Albemarle Point*, distant 17 miles from Cape Berkeley. In the northern part of the island is one of its volcanoes, of which, Capt. FitzRoy says, the black streams of lava that have flowed in every direction down the sides of the mountain looked like immense streams of ink.

At 15 miles from Cape Berkeley, and the same distance from Point Albemarle, is the REDONDO ROCK, which is thus 11 miles from the shore. It is a high barren rock, about a quarter of a mile in circumference, and is visible as far as 8 or 9 leagues, and has soundings, in 30 fathoms, a quarter of a mile off.*

CULPEPPER ISLAND is the northernmost of the group; the summit of it is placed by Capt. FitzRoy in lat. $1^{\circ} 22' 55''$ N., and lon. $91^{\circ} 53' 30''$ W. It is a high, rocky, barren little island, similar to Wenman Island, to the S.E. of it.†

WENMAN ISLAND is next South of it; its N.W. summit is in lat. $1^{\circ} 39' 30''$ N., lon. $92^{\circ} 4' 30''$ W. It is the centre of an extinct volcano, and is high, small, and quite barren; correctly speaking, there are three islets and a large rock, near each other, which, at a distance, appear as one island, but they are fragments of the same crater.

ABINGDON ISLAND is the next in succession. It was called Earl of Abingdon Island, and was well known to the bucaniers. Its summit is in lat. $0^{\circ} 34' 25''$ N., and lon. $90^{\circ} 48' 10''$ W. It is a small island, high towards the South end, being tolerably covered with stunted wood; at this part is the only bay or anchoring place in the island. The North end is low, barren, and one entire clinker, with breakers stretching out to a considerable distance.‡

This island was chosen by Capt. Basil Hall, as being near the equator, for the site of the pendulum experiments, the object of his voyage, in January, 1822. These are described in the Philosophical Transactions for 1823.

Abingdon Island, says Capt. Hall, is 10 or 12 miles (7 miles) in length, the North end being a series of long, low, and very rugged streams of lava, the peak standing about one-third of the whole length from the South extreme. The rock at different places not far from the station was found to be full of caverns, into which the tide flowed and ebbed through subterranean channels, the outer crust of the stream having, as frequently happens, served as the pipe to conduct the lava off.

The spot chosen for the experiments lies near the extremity of a point of land running into the sea, at the South end of the island, and forms the western side of a small bay, about a mile across. The point is part of an ancient stream of lava, which has flowed down the side of a peaked mountain, between 2 and 3 miles distant from the station, in a direction nearly North, and about 2,000 feet high. The peak slopes rapidly at first, forming a tolerably steep cone, but terminated by a broad and gently inclined base of $1\frac{1}{2}$ miles. The mountain is studded on every side with craters, or mouths, from whence, at different periods, streams of lava have issued, and running far into the sea, have formed projecting

* Colnett, p. 148.

† FitzRoy, p. 501; Colnett, p. 151.

‡ Colnett, p. 152.

points such as that on which the pendulum station was fixed. The western face of the island presents a cliff nearly perpendicular, and not less than 1,000 feet high. Capt. FitzRoy says it is a fine, bold-looking cliff, considerably higher than any he saw in the Galapagos (p. 501); it exhibits the rude stratification of lava, tufa, and ashes, which characterizes the fracture of ancient volcanic mountains.

We have here extracted more from the interesting journal of Capt. B. Hall (part ii. chap. 38) than the importance of the island demands in itself, but it is rendered more interesting from his visit.

BINDLOE'S ISLAND lies next to Abingdon Island. Its southernmost summit is in lat. $0^{\circ} 18' 50''$ N., and lon. $90^{\circ} 33' 55''$ W. It has an irregular hilly surface, partially wooded, but like the rest is a mass of lava, and indicates sandy mud.

TOWER'S ISLAND, in lat. $0^{\circ} 20' 0''$ N., lon. $90^{\circ} 2' 30''$, is different from all the other islands of the archipelago, being low and flat.

JAMES ISLAND derives its name from the Stuarts, the reigning family at the time of their being first much frequented.* The Sugar-loaf, 1,200 feet high at its western end, is in lat. $0^{\circ} 15' 20''$ N., lon. $90^{\circ} 56' 40''$. It is a high, large, and well-wooded tract of ground, or rather lava.

Although there is abundance of water on the higher parts of the island, so broken and dry are the lower grounds that it does not arrive at the shore; at two places only can enough water for even a boat's crew be procured in the dry season, and for a ship there is scarcely hope of a sufficiency. Capt. FitzRoy found a party of settlers on it from Charles Island, who were employed in salting fish and extracting oil from the terrapin. This oil is of exceedingly good quality, and of a light colour, being very like pure olive oil.†

Mr. Darwin, who was on the island for a week with a party from the *Beagle*, says that, like the other islands, the lower region is covered by nearly leafless bushes, but here many of them grow to the size of trees. He measured several which were 2 feet in diameter, and some even 2 feet 9 inches. The upper region being kept damp, from the moisture of the condensed clouds, supports a green and flourishing vegetation. At one part is a salt lake, a circular crater, with beautifully crystallized white salt, from which this useful article is procured.‡

"The Sugar-loaf is sufficiently remarkable to arrest the attention when navigating amongst these islands, which unquestionably owe their origin to volcanic eruptions.

"It stands on the western side of James Island, and carries its breadth well up towards the top, which, from appearance, I should take to be upwards of 1,000 feet high (1,200 feet); the dome of St. Paul's, were it on a larger scale, would not be much unlike it.

"A little to the northward and eastward of this Sugar-loaf is the anchorage marked on Colnett's chart, but the *Conway*, from being somewhat too far off shore, with light winds, strong N.W. currents, and no soundings, was swept past, and could not regain the spot, though the attempt was made on the following day."—(Lieutenant Foster.)

* See Cowley's Voyage, 1684.

† FitzRoy, p. 497.

‡ Darwin, pp. 458-9.

Capt. Pipon, R.N., says, July, 1814 :—" The anchorage at this island we found to be in a very snug bay, the best situation in 12 fathoms (the *Tagus* was in 6 fathoms), fine sandy bottom, but rather too near the shore, being within three-quarters of a mile, with the following bearings : Albany Island, N.N.W. $\frac{1}{4}$ W. ; Mount Terrapin, S. $\frac{1}{2}$ W. ; the South extreme point of the bay, S.S.W. $\frac{3}{4}$ W.

" Here wood may easily be procured, and, from the appearance of great quantities having been cut in this neighbourhood, I imagine it is much frequented by English whalers. At the foot of a hill, which we named Mount Terrapin, a small run of water was discovered, but I do not think it practicable, with every possible care, that more than a few beakers could be collected daily ; though perhaps in the rainy season one might be more successful, as the rivulet bore evident marks of there having been occasionally a rush of water, as the rock on each side was much worn away ; it is probable, however, that it does not originate in any spring, but from a deposit of rain water oozing out of the upper part of the land. The land in this neighbourhood has every appearance of a volcanic eruption having lately visited this place, the earth bearing marks of having been convulsed, and streams of lava to have flowed in many directions. The access, however, to the little rivulet is tolerably easy, and is about $1\frac{1}{2}$ miles from the landing place, fine grass and trees only occupying the space between it and the cove in which we landed. Here we also procured a quantity of grass for the stock, which proved of great advantage and benefit to us during our route to the Marquesas Islands.

" Abundance of terrapin were found here, chiefly at the foot of the hill, which occasioned our naming it Mount Terrapin. In the sandy bay opposite our anchorage the finest gray mullets were caught with a seine, and in such extraordinary quantities as almost exceeds belief. Iguanas were also very plentiful, and some goats were seen on the island."

JERVIS ISLAND lies 3 or 4 miles South of James Island. There is anchorage on the N.W. side of it, where whale-ships sometimes refit. Ships may anchor here and send their boats straight over to James Island for terrapin and turtles, there being no anchorage on the South side of the latter island.*

DUNCAN ISLAND† has deep water all round it, and it has no harbour ; but there is anchorage for vessels drawing 12 or 13 feet in a small creek on the North side of the island. It appears bluff and barren on all sides.

INDEFATIGABLE ISLAND is the next to James Island. It is the third in magnitude of the group. Mr. Allan, of H.M.S. *Conway*, calls it Duncan Island, but that island is to the West of it. Capt. Colnett's chart is very defective in this part, and has misled. It is about 24 miles from East to West, and 17 from North to South. Its northern end appears to be the Norfolk Island of Capt. Colnett.

There is good anchorage in the bay which is on the N.W. end of the island, subsequently named Conway Bay : it is formed by a group of small islands on

* Mr. R. C. Allan, H.M.S. *Conway*, 1835.

† Mr. Allan calls this Crossman Island, but, from the bearings, &c., what is now known as Duncan Island is meant.

the North, by the island on the East, and on the South by a high rocky island or islet. The bearings from the *Conway's* anchorage were—the North extreme of Duncan Island, W.S.W.; the extremes of the islet, S. $\frac{1}{2}$ E., and S.W. $\frac{3}{4}$ W.; and the West extreme of *Guy Fawke's group*, N. $\frac{1}{4}$ W., in $7\frac{1}{2}$ fathoms, sand. Two ships' length in-shore of this berth is the outer edge of a flat extending out from the beach. Vessels sailing into this bay should take in their light-sails, as very strong puffs of wind frequently blow over the land. There are two reefs of rocks extending off the South side of the island, which should not be approached nearer than 2 miles by strangers. There is good landing for boats, and abundance of terrapin and turtles may be procured.

BARRINGTON ISLAND is in lat. $0^{\circ} 50' 30''$ S., lon. $90^{\circ} 10'$, this is for the summit at the West end. It was so named by Colnett, with Duncan and Jervis Islands, after the three admirals. Colnett says it is of moderate height, and rises in hummocks; the South end is low, running on a parallel with the water's edge.* FitzRoy says it is not high, yet the shores are bold and fronted by cliffs; the more elevated parts appear to be level, and rather woody.†

CHARLES ISLAND, though one of the smallest of the group, is one of the most important, because upon it is the only permanent settlement, *La Floriania*, or *Floriade*, as mentioned in the early part of this description. It lies in the island, $4\frac{1}{2}$ miles inland, behind Black Beach Road, and is not seen in passing along the coast. It was called Charles Island, after the Stuarts, by the bucaniers.

Charles Island is peculiar in its outline; for a succession of round topped hills, precisely similar in shape, though differing in size, shows on every point of view. This exact similarity is very remarkable. The highest and largest of these hills rises 1,800 feet, the next about 1,700; the rest are of various smaller heights. The northern sides of the island are wooded; but the wood looks as brown as that on the lower parts of Chatham Island.‡

POST OFFICE BAY, on the North side, is sheltered, easy of access, has excellent anchorage, and only wants fresh water to make it a most desirable place for shipping. Its name is the result of a custom established by the whalers; a box was placed on a post to receive letters, and homeward bound ships examined the directions, taking with them all which they might have the means of forwarding; but since the island has been peopled the box has been empty, for letters are left at the settlement.

The inhabitants, now reduced to about twenty-five in number, chiefly depend upon terrapin for their meat, and the quantity of tortoise-shells lying about on the ground shows the havoc that has been made among them. They have also abundance of vegetables. There are goats and hogs upon the island, but they are scarce and wild. Small birds are numerous, and so remarkably tame that they may be knocked down with a stick.

The S.W. extreme of the island is not inaptly named Saddle Point. There does not appear to be any anchorage along the South shore. Off the eastern end

* Page 155.

† Page 489.

‡ The beach at Charles Island is called *Pat's Landing*, from an Irishman who lived alone on the island eighteen or twenty years, with occasionally a sailor or two, deserters from the ships touching. He was killed in attempting to bring a wife off from Guayaquil.—*Coulter's Adventures in the Pacific*, Dublin, 1845, p. 42.

are some islets, of which the largest two were named by Colnett after Admirals Gardner and Caldwell. All these islands are volcanic, and about a mile south-eastward of Gardner Island is a dangerous breaker.

"CHARLES BAY" (Post Office Bay), says Capt. Pipon, July 25, 1814, "is very snug, the bottom a fine sand, and the soundings are gradual from 13 to 6 fathoms. The best anchorage is about the middle of the bay; towards the East part it is rather rocky. Turtle and fish were caught here in great abundance, and seals also were numerous. The land-tortoise, or terrapin, was not met with here. We searched in vain for fresh water on the island. Wood might be procured, but with some difficulty, the island being overgrown with bushes, that renders it almost impenetrable.

"The tides in this bay rise and fall from 7 to 8 feet, and flow full and change at two o'clock. The anchorage is on the N.E. side of the island, and is indeed the only anchorage in the island. Birds were so tame that they suffered themselves to be taken by the hand, and were of various kinds and beautiful plumage."

HOOD'S ISLAND is the southernmost of the group. It may have been known in early times, but as Colnett, who first described it, could not identify it with former accounts, he called it after Lord Hood.* Capt. FitzRoy says it is small, neither high nor low, rugged, covered with small sunburnt brushwood, and bounded by a bold, rocky shore. Some small beaches of white sand are visible here and there.† Its eastern summit is in lat. $1^{\circ} 25' 0''$ S., lon. $89^{\circ} 43' 55''$ W.

THE MACGOWEN SHOAL, which lies between Hood and Charles Islands, is a very formidable danger. The centre lies in lat. $1^{\circ} 8' 30''$ S., lon. $89^{\circ} 59' 30''$ W. When Capt. FitzRoy first saw it on the horizon it hardly differed from the topping of a sea; once only in about ten minutes it showed distinctly. One rock at the West end is just awash, but there is another under water, except in the hollow of a swell, about half a mile to the eastward, which is exceedingly treacherous.

CHATHAM ISLAND is the easternmost of the group. MOUNT PITT, its eastern summit, is in lat. $0^{\circ} 44' 15''$, lon. $89^{\circ} 20' 45''$ W. It is of considerable importance to shipping from the fact that it is the only island of the Galapagos where ships can water at all times of the year. It is also an interesting portion of the group, inasmuch as it is frequently the land first made in the passage from the South American coast. Capt. Colnett gives a long description of it and its productions which will interest the reader, but are too long for this place.‡ As Capt. FitzRoy's description of it is complete, we will transcribe his narrative:—"September 15th, 1835. Uncertain of the strength, and even of the direction of the currents—though aware that at times the former is very considerable—we were anxiously looking out for land, when what appeared to be an islet was seen from the mast-head. This seeming islet turned out to be the summit of Mount Pitt, a remarkable hill at the N.E. end of Chatham Island (Charles Island of Cowley, 1684). As the breeze and current carried us onwards, the tops of other hills successively appeared, and for a short time looked very like a cluster of islets.

Gradually rising above the horizon, the greater part of Chatham Island became

* Colnett, p. 60.

† FitzRoy, p. 486.

‡ See pages 47 to 59 of Colnett's Voyage.

distinctly visible; in this neighbourhood it is not often that the air near the water is clear enough to allow of very distant high land being thus gradually raised above the horizon of an eye at the mast-head; for in general clouds hang about these islands, and the atmosphere itself is hazy. Towards evening the higher parts of the land were clouded over, but we were near enough to see that the island was very rugged, and in some places quite barren, in others covered with a stunted and sun-dried brushwood, and that the heights on which the clouds hang were thickly clothed with greenwood. The shores seemed to be bold, and easy to approach, though not to land upon, because of a continual high surf.

A number of little craters (as they appeared to be),* and huge, irregular-shaped masses of lava rock, gave a strangely misleading appearance to the lower parts of the island; and when first seen through that indistinct glimmer which is usually noticed over land on which a hot sun is shining, were supposed to be large trees and thick wood.† . . . In continuing our course we passed through several rippings, apparently caused by the meeting of streams of current which set along the shores of Chatham Island, from the East toward the West. If not so caused, they must be the effects of currents passing over very uneven ground, but we got no bottom with 50 fathoms of line. When such appearances are created by shoals, it should be remembered that the shallowest place is generally under the smoothest part, close to the ripple. Favoured by smooth water and fine weather, we passed close to the low S.W. extreme, and anchored directly that point was found to defend us from the swell.

This part of the island is low and very rugged. We landed upon black, dismal-looking heaps of broken lava, forming a shore fit for Pandemonium. Innumerable crabs and hideous iguanas started in every direction as we scrambled from rock to rock. Few animals are uglier than these iguanas; they are lizard-shaped, about three feet in length, of a dirty black colour, with a great mouth, and a pouch hanging under it, a kind of horny mane upon the neck and back, and long claws and tail. These reptiles swim with ease and swiftness, but use their tails only at that time. At a few yards from the water we found vegetation abundant, though the only soil seen was a little loose dusty earth, scattered upon and between the broken lava. Walking is extremely difficult. A hand-barrow was lying at the landing place, which showed that terrapin were to be got near us, though we did not then see any. The men from whalers and sealing vessels carry the large terrapin, or land-tortoise, on these barrows.

* Mr. Darwin, too, in reference to these remarkable features of these singular islands, says:—"One night I slept on shore, on a part of the island where some black cones, the former chimneys of the subterranean heated fluids, were extraordinarily numerous. From one small eminence, I counted sixty of these truncated hillocks, which were all surmounted by a more or less perfect crater. The greater number consisted merely of a ring of red scoræ, or slags, cemented together; and their height above the plain of lava was not more than from 50 to 100 feet. From their regular form they gave the country a *workshop* appearance, which strongly reminded me of those parts of Staffordshire where the great iron foundries are most numerous."—P. 455. See also Colnett, p. 51.

† "This glimmering haziness is at all times a great impediment to making accurate measurements of an object, when both it and the observer's eye are near the ground. Raising either some few feet higher remedies this inconvenience, which was much felt when using a micrometer for measuring a base."—R. F.

Ascending a little hill, we were surprised to find much brush or underwood, and trees of considerable size, as large in the trunk as one man could clasp. These were prickly pears, and a kind of gum tree; how their roots are able to penetrate, or derive nourishment from the hard lava, it is *hard* to say; for earth there is scarcely any. Wild cotton shrubs are numerous. This first excursion had no tendency to raise our ideas of the Galapagos Islands.*

17th.—Weighed and stood along shore, sounding. There was good anchorage until near the S.W. point of Stephen's Bay, off which the water is shoal, and the bottom uneven.† We anchored in Stephen's Bay (on the N.W. side), and found an American whaler lying there. This bay is large, and the anchoring ground generally good; but the landing is bad at low water. There is no fresh water; and it is frequently difficult to enter as well as to leave, because, usually becalmed by high land, it seldom feels the true wind. Enderby Cove is only fit for a boat; at low water it is full of rocks.‡

The KICKER ROCK is a curious mass of stone rising almost perpendicularly from the bottom of the sea, where it is 30 fathoms deep, and in the offing (to the North of the West point) is another (called the Dalrymple by Colnett), which looks exactly like a ship becalmed with all sail set. Seeing a remarkable hill at the N.E. side of the bay, which had not an appearance like other parts of the island, I went to it in a boat, hoping to find water near the foot, and to have a good view from the summit. Disappointed in both ways, the hill being composed of crumbling sandstone and almost inaccessible, I returned to the ship early next morning. Several new birds were seen by those on shore, and many fish were caught on board, of which the best and most numerous were a kind of rock cod of large size.

18th.—Weighed and stood along shore until noon, when we anchored close to a low rugged point, near the N.E. end of the island; employed two boats in examining the shore, and landed a party to look for terrapin. Throughout this day it blew so fresh a breeze that double-reefed topsails were as much as could be carried; but I think this strength of wind only prevailed under the lee of the island, where the wind rushed down in squalls, after having been intercepted and

* In a valley in the middle of Chatham Island, Dr. Coulter states that he discovered *coal* in large quantities, extending away under the hills, and says that an immense supply of it might be obtained. "It quickly ignited, flamed up, and burned after the cheerful manner of Kendal (query, Cannel) coal."—*Coulter*, pp. 106-7.

† *Wreck Bay* is inhabited (1848) by a native of Guayaquil, called here General Mena, and a person of the name of Gurney, who calls himself an Englishman. They maintain themselves by supplying the American whalers with terrapins, and having exhausted the shores of these animals, they now seek them in the interior, which they describe to be generally much more fertile than near the coast, and to contain many water springs. They have put into cultivation some acres about 7 miles from Wreck Bay, which is more sheltered, and has a better beach, than the other anchorages.

The French brig-of-war, *La Genie*, in August last, dug a well through the clay, the lava being only superficial, but it was too near the beach, and the water in it, and in the ponds described by Capt. Kellet, I found to be quite salt.—*Adm. Sir Geo. Seymour, K.C.B., Journ. R. Geog. Soc.* 1849, p. 21.

‡ Capt. Pison, of H.M.S. *Tagus*, 1815, says:—"Enderby Cove is a very snug one, and best adapted for wooding, from the extreme smooth sea in it, and the convenient little beaches.

"The best anchorage, on examining this bay, we found to be on the East side of it; you may anchor in from 20 to 7 fathoms, in general a hard white sand. Towards the centre of the bay, as you approach the shore, it becomes more rocky and stony."—Capt. FitzRoy, however, from his better opportunities, we should judge was the better authority.

checked by the high land. All the hills appear to have been the craters of volcanoes; some are of sandy mud, others are lava. There is plenty of wood hereabouts, though stunted and dry. On no part of this shore is there a chance of finding water; all is stony, without any soil which could either collect or carry it off. Our party brought eighteen terrapins on board. In size they were not remarkable, none exceeding eighty pounds. This animal appears to be well defended by nature; but, in truth, it is rather helpless and easily injured. The shell is slight, and becomes weaker (in proportion to the animal's size) as the tortoise grows older.

19th.—Sailed round the N.E. extremity of the island, and worked to the southward against a tide, or rather current, setting strongly to the northward.

20th.—At daylight we were off the S.E. part of the island, and continued working to the S.W. during the forenoon, along a shore quite bold, excepting the small rocks above water in 'Middle' Bay. At noon, seeing a small cove, I went in a boat to examine it and look for water. We found no signs of any in that place; but a little farther West a fine stream was seen falling from a lava-cliff, about 30 feet high. Mr. Low had described this waterfall correctly, and his account of the watering place near it was soon verified, by our discovering a cove half a mile to the westward of the cascade. We landed on a stony beach in the cove, and found a fine stream of excellent water; two others were likewise seen, but they were inaccessible. This water runs from the highest parts of the island (which are almost always enveloped in clouds) down a large valley. This is the only watering place throughout the year.* All this southern side of the island is well wooded, and on the higher ground the wood is very green. . . . Continuing our course along shore, we arrived at our former anchorage in Stephen's Bay.

22nd.—So generally cloudy is the weather here, that a day such as this proved to be, of hot, vertical sunshine, was much felt by everybody; and to show how objectionable our anchorage was in this respect, I may mention that a fresh breeze was blowing all day in the offing, yet in the bay only light, variable airs were felt."†

We have thus described all the islands of this singular group, and in these descriptions we may have been more diffuse upon matters not strictly nautical than may be absolutely necessary for a work like this; but as they form one of the most remarkable, among many singular, features of the Pacific Ocean, they cannot but be interesting. Whether they are considered in the physical formation so distinct to the low coral groups which dot this vast expanse of waters; the strong and devious currents which surround them, varying so much from other

* The anchorage at the watering place is quite secure, though it appeared strange to remain in such a spot, only three cables' length from a surf upon a steep cliff shore. The great S.W. swell is broken by Hood Island, and the southerly trade wind is so moderate that no harm is to be apprehended from it. Upon this point, however, Rear-Admiral Sir Geo. Seymour says:—"The *Beagle* and *Daphne* here completed their water in 1832 and 1845; but from the swell that sets on the shore, if large ships frequented these islands, I think it would be necessary to bring water to them in a tank-vessel, and to some sheltered anchorage, instead of leaving them exposed to the difficulty of getting under weigh from this place, when they must lie close to the shore, and on the weather side of the island."—*Journal of the Royal Geographical Society*, 1849, p. 21.

† Narrative of the Voyage of the *Beagle*, vol. ii. pp. 486—489.

portions of the great ocean; the active volcanic agency everywhere visible; their position on the equator; their importance to the shipping for the supplies they afford, and the very singular nature of these supplies; the Galapagos Islands—the “Tortoise Archipelago”—must be evident as one of the most interesting features of the globe.

CHAPTER XXIX.

THE MARQUESAS ISLANDS, ETC.

THE Marquesas Archipelago is composed of two tolerably distinct groups, lying in a general N.W. and S.E. direction, between the parallels of $7^{\circ} 50'$ and $10^{\circ} 31'$ S., and lon. $138^{\circ} 39'$ and $140^{\circ} 46'$ W. They are all of volcanic origin, very high, and may be seen in clear weather at 15 or 20 leagues' distance. The Archipelago is now under French dominion.

The southern group was the first discovered, and the honour of this event is due to Mendaña, who, in 1595, named them the *Islas de Marquesas de Mendoza*, in honour of the viceroy of Peru, who had despatched his expedition. *Madalena*, or the southernmost island, was the first landfall of Mendaña. The following is an account of their discovery:—

In 1594, King Philip II. of Spain sent a letter to the viceroy of Peru, the Marquis de Cañete, recommending the encouragement of enterprises for new discoveries and settlements, as the best means to disembarass the land from many idle gentry. In the following year an armament of four vessels, with 378 men, was fitted out for the purpose of forming a settlement at the Island of San Christobal, one of the Salomon Islands. Alvaro de Mendaña, who had discovered these islands twenty-eight years before, was then in Peru, and was appointed to the command of the expedition, with the title of Adelantado (nearly synonymous with Excellency).*

They left Payta, in Peru, June 16th, 1595, and on July 21st discovered an island, which Mendaña named *La Madalena*, greatly rejoicing at having made, as he supposed, so quick a passage to the Salomon Islands, of which he took it to be part. His first interviews with the natives were peaceable and cordial, but a piece of brutality by one of the soldiers led to an outbreak and to a slaughter which reflects no great credit on the character of Mendaña. They soon came to the conclusion that they were not the islands they were in quest of. The adelantado took possession of them (at Port Madre de Dios, July 28), after prayers, in the name of the King of Spain, naming them *Las Marquesas de Mendoza*, out of respect to the Marquis de Cañete. Mendaña's discoveries were

* See Burney, vol. ii. p. 134.

limited to four islands—Santa Christina or Tahuata, La Dominica or Hiva-oo, San Pedro or Mohotani, and Santa Madaleña or Fatuiva.

The islands of the S.E. group are Sta. Christina, or Tahuata, or Taouata, or Taowatte, or O-Hitao; San Pedro, or O-Natenya, or Motane; La Dominica, or O-Hiva-oo; and, lastly, Hood Island, or Fetugu, or Fetou Hougou. The last was discovered by Cook, in 1774, and named by him after the young midshipman who first announced it. This person was afterwards a celebrated man; he became Lord Hood.

The N.W. group consists of six islands—Roapoa; Roa-Houga, Houa-houna, or Uahuga, or Washington, or Adams; Nuka-Hiva, or Nuhahiva, or Nuhuhiva, the principal; Motua-iti or Hergest; Hiau, and Fattuubu, the north-westernmost. This group has sometimes been called by a distinct name—the *Washington Islands*, and are thus described by Krusenstern; but in considering the isolated position of the whole archipelago, their similarity of characters, the language, manners, and appearance of their inhabitants, all unite in removing any idea of them being separate groups. For this reason it is but strictly just that they should be named, generally, by the title applied by their first discoverer, the Marquesas de Mendoça Islands, or more simply and now usually contracted to the Marquesas.

This N.W. group was not discovered until many years after the rest, in 1791, by Capt. Ingraham, of the American trader *Hope*, of Boston.* A few weeks after Capt. Marchand, in the French ship *La Solide*, also discovered them, and, taking possession of one, called it Marchand Island. He named all but one, Uahuga, the easternmost, and called the whole group *Iles de la Revolution*.† In the next year Lieutenant Hergest, in the transport *Dadalus*, surveyed them accurately, and named his harbour Port Anna Maria, or Nuka-Hiva. Vancouver named them, in consequence, *Hergest's Islands*, after his unfortunate friend, who was murdered, as well as Mr. Gooch, the astronomer, at Oahu, one of the Sandwich Islands.‡ In 1793 Capt. Josiah Roberts, of the American ship *Jefferson*, gave them the name of *Washington Islands*,§ a name also applied to Uahuga by Ingraham, their first discoverer; and this is their title to this name. However, it may now be considered as abandoned.

The Marquesas, although of volcanic formation, have no active volcanoes, and do not appear to be subject to earthquakes. They are all very high, and the land is very irregular and broken. The greater part of the mountains forming the axes of the islands are in the interior, and from their ramifications extend to different points of the coast, forming ravines or valleys, more or less fertile, in which the different tribes composing the population are established. The possession of these valleys is one of the causes of the incessant wars which they carry on.

The NATIVES of the Marquesas have been often described. They do not seem to have any form of government, each tribe living separately and independently. The only title of distinction is that of *ariki*, generally translated chief, or king,

* Zach's Monthly Correspondence, vol. i. p. 348; Extr. of the Mem. of the Massachusetts Company for 1795.

† Voyage of Capt. Marchand in *La Solide*, by Fleurieu.

‡ Vancouver's Voyage, vol. iii. pp. 96-7.

§ Voyage dans les États Unis, par La Rochefoucault Liancourt, tome iii. p. 23.

but it means only the superiority of riches. They do not appear to have any religion or worship, although some of their traditions and customs have evidently some hidden meaning. The law of *tabu* is well known and respected, and enters largely into their customs. From there being no general law or government, the only appeal from an injury is to arms, hence the great number of quarrels and wars which agitate the community. At different periods various missionaries have essayed to establish themselves here, but they have all failed; not a single true conversion has taken place. This is in great part owing to the bad example and advice of the white deserters from passing vessels, who are found among them, living in the same manner, and aiding in their disputes and wars. For a great number of years Dominica (or O-Hiva-oa) was the most disturbed by warfare of all the islands. In the course of the year 1837 there were five or six disputes, all of which ended in fighting. They are very warlike, but they are only passionate cowards. Almost all the islands are now provided with fire-arms, and these, with powder, have been the best articles of commerce. The demand for money, as a means of barter, will grow. After a combat, and a prisoner is taken, a fire is kindled, and great rejoicing is made. They place the victim over this, usually after killing him by a blow on the head, but at other times quite alive, and, as soon as he is roasted, they collect in a circle and devour him, but, from a superstitious motive, they do not allow the women to approach or take part in these horrible festivities.

The one great feature which distinguishes these natives in the eyes of Europeans is their unbounded licentiousness. The women, by some elevated to the highest standard of beauty and grace, by others considered on the ordinary level of the race, appear to have not the slightest idea of chastity or delicacy. Their whole conduct, gesture, and motive appear directed to one end. They have no marriage ties or ceremonies among themselves, and fathers, brothers, and husbands, equally unite with the females in the assiduous and undisguised display of their personal charms. Even children of tender age, from eight years and upwards, are not free from this character. It has been often portrayed, and must be familiar to all readers of the Pacific voyages. It is a point, too, which ought to weigh much with the commander who would bring his ship here.*

In the present state of the Marquesas they offer few resources for commerce; a small quantity of sandal-wood is the only article to be procured, and this has been wantonly destroyed, without regard to the future: their only utility to the navigator can be to revictual or refresh.

The following observations on this subject, by Admiral Krusenstern, in 1806, still hold good in many respects:—"Ships must not expect, after a voyage round Cape Horn, which, if they sail from a port in the Brazils, they have little chance of weathering in less than three months, to be able to refresh their crews at these islands, sufficient to prosecute their voyages either to America or Kamtschatka, as it is very doubtful whether they can even supply them with provisions for their daily consumption. Wood and water are the only two articles they may depend upon procuring in sufficient quantity, and without the assistance of the natives, who swim with the water casks through the heavy surf,

* A glowing account of the natives will be found in a work entitled, *A Leaf from the Marquesas*.

with a facility that surprises a European, while he is quite unable to imitate it; even this task would be very arduous, and might also prove dangerous; for, upon any sudden disagreement, the water party would be instantly cut off: and such a disagreement may easily happen, any slight misunderstanding giving rise to it, as we ourselves experienced. Ships bound to Kamtschatka by the way of Cape Horn would, therefore, do better to sail directly from the Brazils to the Society Islands, the Navigator's Islands, or to the Tonga Islands, where they may supply themselves at least for six or eight weeks with fresh provisions. On the other hand, ships destined for the N.W. coast of America, or the Island of Kodiack, would find it more advantageous to put into one of the ports of Chile, where they will find not only an abundance of provision, but, what is of greater importance to Kodiack and the colonies on the coast of America, may be supplied with Indian corn and wheat. The run from Chile to Kodiack is not too great; those who deem it so, may touch at the Sandwich Islands, which do not lie much out of their way." *

Capt. D'Urville also, in confirmation of the foregoing, says that for refreshment the Sandwich Islands or Tahiti ought to be preferred beyond all comparison. Before this group can rise to any great importance, the people must become industrious; the land would then become productive, and refreshments and other aids would then be abundant. In a military view Nuka-Hiva is the most important; Ports Anna Maria and Tschitschagoff are perfectly safe, and could be easily defended. Its capability for the supply of vessels, too, is at present not inferior to the rest.

In all the inhabited islands there are pigs, goats, and fowl; all these live wild, and readily multiply. Cattle have been several times introduced, but have all been prematurely destroyed; but when D'Urville left, he heard that Mr. Holworthy, an English missionary, had a flock of horned cattle, not numerous enough, however, for the supply of ships.

The islands surrendered to the sovereignty of France by treaty with Admiral Du Petit Thouars, May, 1842.†

The *climate* of these islands must always be very sultry. In Marchand's voyage it is said that at Port Madre de Dios the thermometer stood at 27° in June. During Krusenstern's stay in Port Anna Maria, the maximum height on board was 25°, but it generally stood at 23° and 24°, and the heat on shore was in all probability 2° greater. Notwithstanding this the climate appears to be very healthy, and the Europeans who have dwelt here state that it cannot be more so, an assertion which is justified by their appearance.

The winter months, as is always the case between the tropics, constitute the rainy season; but this is said not to continue long in these islands, ten months and more frequently passing without a drop of rain. When this unfortunately happens, a general famine ensues, attended by the most dreadful consequences, and inciting the inhabitants to acts of a more horrible nature than any other people can afford an example of.

* Voyage Round the World, &c., by Capt. A. J. Von Krusenstern, translated by Richard Belgrave Hoppner, vol. i. p. 143.

† See Times, December 21 and December 29, 1842.

The *reigning wind* between these islands is the S.E. trade wind, which varies some degrees either to the East or South; S.W. winds are, however, felt here, and blow for a tolerably long continuance, when the inhabitants of these islands avail themselves of it, to visit their neighbours to the S.E. (Krusenstern). At the larger islands land and sea-breezes usually set in.

The *current* generally sets to the westward, between W.N.W. and W.S.W., and its velocity is about half a mile an hour.

The variation, in 1838, was $5^{\circ} 0' E$.

FATU-HIVA or MADALENA is the southernmost of the Marquesas, and was the first discovered, on the eve of St. Magdalen's day, by Mendaña. It is about 8 miles long North and South, and 4 miles broad. Its S.S.W. or *Venus Point* is formed by a high and remarkable mountain, very much peaked, 3,670 feet high. This point is in lat. $10^{\circ} 30' 40'' S$, lon. $138^{\circ} 43' 15''$. Immediately to the West of this is a delicious valley at the bottom of a pleasant bay, *Bonrepas Bay*, before which there is anchorage. The people who came off to the *Astrolabe* from this were ugly, covered with scrofulous tumours and ulcers, of a most repulsive appearance. Two or three miles to the North of this is a second equally pleasant valley (*Kerges Bay*), which seemed to be as well peopled. The population was estimated at 1,800.

MOTANE, or MOHOTANI, or SAN PEDRO, is a high island; it extends from N.N.W. to S.S.E. about 5 miles in length; it is wooded on its summit, which is 1,700 feet above the sea, and in the ravines. At the S.S.E. point there is a large, high, isolated rock, in lat. $10^{\circ} 0' 40'' S$, lon. $138^{\circ} 49' 30'' W$, between which and the land there is a channel so narrow that it could only be attempted by boats. This island has no fixed inhabitants.

La Solide Bank extends 13 miles due South from San Pedro. It has 10 fathoms, rocky bottom, over a portion of it, and 18 fathoms, rock, at its South end.

TAHUATA or SANTA CHRISTINA is 9 miles long in a North and South direction, and about 7 leagues in circuit. A narrow ridge of hills, of considerable height, extends the whole length of the island. The highest summit is 3,280 feet high. There are other ridges, which, rising from the sea, and with an equal ascent, join the main ridge. These are disjoined by deep narrow valleys, and watered by fine streams of excellent water.

The inhabitants are estimated at about 800 in number, or by Mr. Bennett at 1,400.

"However friendly these islanders may appear to be, it is the duty of every commander of a ship visiting them to be on his guard, for they are extremely capricious, and capable of committing the greatest outrages when least suspected. When uninfluenced by interested motives, their general manner towards Europeans is far from courteous, and is marked by a rude independence, or assumed superiority, which would declare that they despise white people personally as much as they fear or respect the advantages with which civilization has surrounded them."*

The PORT of MADRE DE DIOS, or VAITAHOU, which Cook named *Port*

Resolution, is situated near the middle of the West side of Santa Christina, and under the highest land in the island. The South point of the bay is a steep rock of considerable height, terminating at the top in a peaked hill, above which you will see a pathway leading up a narrow ridge to the summits of the hills. The North point is not so high, and rises with a more gentle slope. They are a mile from each other, in the direction N. by E. and S. by W. In the bay, which is near three-quarters of a mile deep, and has from 34 to 12 fathoms water, with a clean sandy bottom, are two sandy coves, divided from each other by a rocky point. In each is a rivulet of excellent water. The northern cove is the most commodious for wooding and watering. Here is the little waterfall mentioned by Quiros, Mendaña's pilot; but the town or village is in the other cove. There are several other coves, or bays, on this side of the island; and some of them, especially to the northward, may be mistaken for this, therefore the best direction is the bearing of the West end of La Dominica.*

The watering place in Port Vaitahou or Madre de Dios is in lat. $9^{\circ} 56' 0''$ S, lon. $139^{\circ} 9' 0''$ W.

D'Urville was taken by an English resident pilot, Tom Collins, to *Amanoa Bay*, to the northward of Madre de Dios. He lay here in 14 fathoms, bottom of grayish black sand, and only sheltered from the trade winds.

Other anchorages exist on the same side of the island as *Resolution Bay*, off the valleys of *Abatóni* (*Friendly Cove* of Marchand),† *Anatefaú*, and *Anaaiti*, to the southward of *Resolution Bay*; but they are of small extent, very close to the shore, and the valleys to which they correspond offer no facilities for watering ships.

"Santa Christina, or *Tahuata* of the natives, is separated from La Dominica by a navigable channel, lying due East and West, and not exceeding $2\frac{1}{2}$ miles across. The land extends in a N.N.E. and S.S.W. direction about 10 miles; its circumference is 25 or 30 miles. Its form is typical of that which obtains in all the islands of the group; an elevated mountain runs throughout the centre of the island, throwing off spurs to the East and West towards the sea, and thus dividing the low lands into distinct valleys, which open upon the ocean, but are only accessible by land over the high hills that bound them.

"The coast scenery is neither picturesque nor inviting. Its principal features are black and surf-beaten rocks, naked cliffs of the same gloomy hue, and exposed hills, on which little other vegetation can be seen than scattered clumps of the drooping casuarina tree. The valleys distributed around this island are thirteen in number, each distinguished by a native name; they seldom exceed $1\frac{1}{2}$ or 2 miles in breadth, and rise towards the interior with a gentle activity, luxuriantly vegetated. But little underwood encumbers the soil, which is for the most part a rich dark loam. Some of them possess rivers, or large streams, flowing from the hills; but many are destitute of this supply, and water is nowhere superfluously abundant. Each valley has a sea beach, washed by a long rolling surf, and composed of fine sand, mingled with particles of olivine, coral detritus, shells or pebbles, and in some parts encumbered with black rocks,

* Cook's Second Voyage, vol. ii. pp. 306-7.

† Fleurién's Voyage of Marchand, vol. i. p. 68.

confusedly heaped together. No coral reef encircles and protects the shore of this nor of any other island in the group. The coast is abrupt, and surrounded by blue and fathomless water, which permits a ship to sail within a cable's length of the rocks."*

O-HIVA-OA or LA DOMINICA is the most fertile, the most populous, and the most important for its productions of the whole archipelago. It is about 22 miles long from E. by N. to S. by W., and 7 miles in its average breadth. D'Urville ranged along the North coast from East to West. Before reaching its North point he found two bays, open to the N.E., but which doubtless offer anchorage, perhaps very good ones. There is a bay a little to the West of the North point, and still farther West a second valley, apparently clothed with a rich vegetation, and well peopled. Two or three miles to the West of this bay there is a large cascade, with a considerable volume of water. It may be seen at a great distance, for the water falling from the top of a steep cliff against the rocks is changed directly into white foam, which glistens in the sun, and may be seen afar off. All the North side of Dominica appears clear. At the W.N.W. point there is a double bay, separated by a point having the appearance of a tower. This double bay affords anchorage; it must be safe and convenient in the fine season, being sheltered from the trade winds; but at the season of N. and N.W. winds, from November to February, there would be but little security. Some pleasant houses were seen on it. The eastern point of the island, *Cape Balquerie*, lat. $9^{\circ} 43' 30''$, lon. $138^{\circ} 50''$, is steep, high, and barren. It may be passed close-to. The passage separating Dominica from Santa Christina was named by D'Urville *Bordelaise Strait*, to commemorate the voyage of Capt. Roquefeuille.

The southernmost point of O-Hiva-oa is in lat. $9^{\circ} 51'$, making *Bordelaise Strait* to be a league in breadth. To the East of this point is *Tava Bay*, and to the N.E. of this again is *Taogou Bay*. This latter is separated from *Sandal Bay* to the East of a rocky point. The highest ridge of the island is above *Taogou Bay*, and is 4,130 feet above the sea. The inhabitants are estimated at about 5,000 in number.

FETUGU or HOOD'S ISLAND was discovered on board Cook's ship, the *Resolution*, in 1774, by a midshipman who was afterwards Lord Hood. Capt. Krusenstern saw it from 38 to 35 miles distant. It is lofty (1,180 feet), but not of great circumference. It consists of a single high and, at the summit, almost flat rock, with a gentle inclination from North to South. On the northernmost point there is a division, not very distinct, between the two hills. In Cook's chart there are a number of small islands marked on the South side, but Krusenstern could not see them, but instead he saw some on the N.W. and West sides. D'Urville says that at a mile to the N.N.W. of it is a rock *beneath the water*, which it will be prudent to avoid, because it broke, though the weather was not bad.

"Hood's Island, when bearing S. by E. distant 20 miles, has the appearance

* Bennett's Whaling Voyage, vol. i. pp. 299, 300. Numerous particulars of this island will be found in Figueroa, *Hechos de Don G. H. de Mendocá*, &c., p. 245; Cook's Second Voyage, vol. i. p. 311; George Forster's Voyage, vol. ii. p. 10; Parkinson's Journal of a Voyage, &c., 1773, p. 47; Fleurieu's Voyage of Marchand, vol. i. p. 102, &c.

of a very lofty barren rock, of square form, with a hummock on each side of its base. The Marquesans on board our ship gave it the name of *Fefúku*, described it as uninhabited, and questioned the possibility of effecting a landing upon its shores. Canoes from the neighbouring islands occasionally resort to its coast to fish.*

UAPOA or ROAPOA† ISLAND.—This is what Ingraham calls *Adam's Island*. The officers of *La Solide* called it *Marchand Island*, and Roberts calls it *Washington Island*. Like all the rest of the archipelago, it is of volcanic origin, and is of a more picturesque appearance than any other of the Marquesas.

“ROAPOA, or TREVENNEN ISLAND of Lieutenant Hergest, is the *Marchand Island* of the Voyage of *La Solide*, about the same size as Tahuata, and equally rocky, elevated, and bold. The land extends in a direction nearly North and South; the summits of many of its mountains present conspicuous columns, spires, or pinnacles of rock. Its S.E. extremity is remarkable for a table mountain, topped on each side by a lofty spire; on its South side there are three islets of volcanic rock, which have been named from their respective forms, *Church Island*, *Gunner's Quoin*, and *Sugar-loaf*.

The western side of the land abounds in populous villages, and affords several convenient anchorages, which have been visited by a few south-sea-men, though the island is generally but little known or frequented.

One of the two most convenient anchorages is situated off a village on the S.W. coast, *Amis Bay* of M. Tessan; the other is *Port Jarvis*, on the western side, a small bay, affording anchorage in 18 fathoms, with convenient supplies of wood and water.

“No island we had yet seen appeared to us so perfectly beautiful as Roapoa, when viewed from the ocean on its western side. Its valleys, opening upon the sea as smiling amphitheatres, covered with a luxuriant vegetation, have a tranquil, picturesque, and very inviting aspect, while the hills in their rear, seen in perspective, are lightly timbered with the casuarina and other trees well adapted to the soil they occupy.”‡

At the S.W. point of Roa Poua (D'Urville) there is a cove, very well sheltered against the prevailing winds, before which you can anchor in 18 fathoms. This anchorage is very close to the land; at a mile distance there is no bottom with 200 fathoms. This bay is of a pleasant appearance. Its shores are covered with houses surrounded with cocoa-nut trees. The natives of this island have the reputation of being the most sociable of any in the archipelago. It is the bay where Capt. Marchand met with a friendly reception in June, 1791, and hence he called it *Baie de Bon Accueil*, or *Welcome Bay*.

At the distance of about $1\frac{1}{2}$ miles to the S.E. of the South point of Uapoa is a small flat island, about 2 miles in circumference, which Marchand called *Ile Platte*; Ingraham, *Lincoln Island*; Wilson, *Level Island*; and Roberts, *Revolution*

* Bennett's Whaling Voyage, p. 295.

† Krusenstern says that he could not, after much inquiry at Nuka-Hiva, find the letter “r” in the language.

‡ Bennett's Whaling Voyage, vol. i. pp. 346-7.

Island. The strait between this and Uapoa must be safe, as Roberts had sailed through it. On Capt. Chanal's chart it is called *Obelisk Island*, and is placed in lat. $9^{\circ} 29' 30''$ S., lon. $140^{\circ} 4' 45''$.

UAHUGA, or WASHINGTON ISLAND, as it was named by Ingraham, was called by Hergest *Riou's Island*, and by Roberts *Massachusetts Island*; M. Tesson spells it *Houa-houna*. Its length is 9 miles in an E.N.E. and W.S.W. direction. It has a very striking appearance; from East to West the land rises to a considerable height, and forms in the middle a pretty lofty mountain (2,430 feet), steep toward the West. At a short distance to the westward is a double peak, which, as the eastern end is brought to bear N.W. by N., will disappear, and the high mountain in the middle will assume the form of a cupola, on the West side of which a column of a pyramidal form is conspicuous. On the South side there are two bights, in which an anchorage might be found, but they afford too little shelter for a ship to be there in safety. The West side of the island appears to be most fruitful. At the West end is a rocky island, $1\frac{1}{2}$ miles in circumference, and between the two is a huge flat mass of stone, like a tombstone. The West extremity of the island gradually descends to a steep and very prominent flattened rock, behind which there is said to be a secure harbour, but which Krusenstern could not examine. Its North point, or Danger Point, is in lat. $8^{\circ} 54'$ S., lon. $139^{\circ} 33' 30''$. Off the S.W. end is *Invisible Bay*, formed to the eastward by a detached island. Du Petit Thouars says that this bay is the usual place where ships approach the island to procure fowls, pigs, and fruit, in exchange for powder. He saw neither inhabitants nor canoes here however.

"Riou's or Uahuga Island has many remarkable conical rocks, and its outline is generally much broken, particularly towards its western extremity, where a cluster of islands and rocks form the only bay where any probability of landing seemed to offer. I am informed that this bay has no beach, but that the landing at the rocks is smooth."*

NUKA-HIVA is the principal island of the Marquesas Archipelago. By Ingraham it was called *Federal Island*; by Marchand, *Ile Baux*; by Lieutenant Hergest, *Sir Henry Martin Island*; and by Roberts, *Adam's Island*. All these last must give way to the native name, which is variously spelt. *Nuka-Hiva* (Krusenstern), *Nou-ka-Hiva* (Du Petit Thouars), *Nou-Hiva*, or *Nuuhivah*.

It is 17 miles in length from East to West, and 10 miles broad. It has been frequently visited and described, and its inhabitants are perhaps the best known of any in the archipelago. The details of their revolting cannibalism, their licentiousness, their treachery and apparent friendliness, will be read with great interest in the ninth chapter of Capt. Krusenstern's account of the voyage of the *Nadeshda* and *Neva*.†

The number of people were estimated by Krusenstern, from imperfect data and observation it is true, at 18,000. From the estimate of Roberts, a resident, but diminished one-third, they would be about 12,000, "a number undoubtedly very

* Sir Edward Belcher, *Voyage of the Sulphur*, vol. i. pp. 351-2.

† Translation by Mr. Hoppner, pp. 151-184. In Dr. Coulter's *Adventures in the Pacific*, 1834-1836, will be found an account of a stay among the natives.

small for an island upwards of 60 miles in circumference, particularly as the climate is healthy, the use of kava very moderate, and the venereal poison not yet introduced. On the other hand, the constant wars, human sacrifices, and murders, which are committed as soon as any want of provisions ensues, the shocking depravity of the women, who give themselves up from the age of eight or nine, and the little regard that is paid to connubial vows, must all tend to diminish the population. Roberts was assured that a woman seldom had more than two children, and very often none at all. On an average, therefore, only one child can be calculated on for every married couple, which is scarcely a fourth part of what is supposed in Europe.* Notwithstanding the opinion of Krusenstern that his estimate for so large an island was so low in 1804, it is reduced to 8,000 by the estimate of M. de Tesson in 1838.

The southern coast of Nuka-Hiva contains the principal places of resort and the best anchorages. Capt. Krusenstern thus describes it:—"The coast consists of lofty, rugged rocks, very steep towards the sea, and from which the most beautiful cascades of water are precipitated; among them, one at the southernmost end of the island is particularly remarkable, nor would it be easy to meet with anything more beautiful. The bed of this waterfall appeared to be several fathoms wide, and the water was precipitated from a rock, the height of which might be estimated at 2,000 feet; this cascade was visited by Dr. Tilesius and Dr. Langsdorff, and forms the river which empties itself into Port Tschitschagoff. The chain of rocks is connected with the interior of the island; but to the north-westward of the southern point the coast is lower and flatter, and rises gradually toward the centre."

On the South side there are three harbours where ships may lie in perfect safety, Comptroller Bay, Port Anna Maria, and Port Tschitschagoff. Between Port Anna Maria and the latter there are several small bights or bays, that do not, however, afford an anchorage, being too little defended from the wind, and full of rocks.

CAPE MARTIN is the S.E. point of Nuka-Hiva. According to M. Tesson's chart, it is in lat. $8^{\circ} 58'$ S., lon. $140^{\circ} 2'$ W. Sir Edward Belcher approached it from the eastward; he says:—"At ten we saw the Island of Nuka-Hiva through the haze. As seen from the eastward, it presents a long, low point on its north-eastern limit, and high abrupt heads; to the southward, that of St. Martin's, which forms the eastern head of Comptroller Bay, being very abrupt, and capped with masses of rock like ruined castles. I was much disappointed in the height of the mountains, which I had been led to expect were very lofty, and mention is even made of a cascade 3,000 feet in leap."†

TAIFI, or COMPTROLLER BAY, as it was named by Hergest, is just to the West of Cape Martin. He did not examine it. The following is a recent French account:—"The winds in the interior of this bay blow in the same direction as those outside, but they incline to the S.E. at the opening of the coves of Haka-Haka and Haka-Punae.

"The currents near the *Te-oho-te-kea Rock* and at the entrance of the bay are

* Krusenstern, p. 178.

† Voyage of the *Sulphur*, vol. i. p. 352.

variable, and sometimes bear to the East, but generally they follow the direction of the trade winds.

"Cape Martin, or *Tikapo*, which forms the East point of the bay, may be recognised by a rock, in the form of a tower, which surmounts it. This tower seems to incline towards the sea when seen from the S.W. The *Te-oho-te-kea Rock*, which is 600 yards to the South of the cape, may be taken for a boat under sail when it does not stand against the land.

"High water, full and change, in the Haku-Paa Cove at 3^h 52'; rise, 4 feet 6 inches."*

TAÏ-O-HAE, or PORT ANNA MARIA, is the next to the West. It was visited by Sir Edward Belcher in H.M.S. *Sulphur*, and the following account is given of it:—"Suddenly a sandy beach opened behind an island, which presently discovered a deep and well-sheltered bay, but rather narrow for working. Coming from the eastward, the port may be easily known by a very conspicuous lofty basaltic dyke, which perpendicularly intersects the eastern outer bluff. Vessels intending to enter the bay should keep this bluff about a point on the starboard bow, rounding the island off it *within* a cable's length, when the wind generally leads in. All the eastern shores of the bay are bold-to, and free from danger, and the wind will always lead off.

"The view of the entrance of the bay is beautiful, far surpassing anything I have noticed in these seas; and although rugged, isolated masses of rock here and there start up, to add their sombre effect to the otherwise brilliant tints of the landscape, still the luxuriance of the slopes and valleys (and every inch where vegetation can thrive is stubbornly contested) produces a sensation which cannot justly be intrusted to pen or pencil."†

Sir Edward Belcher fixed his observations in a clear sandy bay to the eastward of the Pilot's Hill, which separates it from the town, the same spot occupied by Porter in 1814, and by the *Astrolabe* and *Zélée* afterwards.

Capt. Krusenstern thus describes the approaches to it:—"As soon as you obtain sight of Nuka-Hiva, coming from the eastward, you immediately perceive *Port Martin*; it has a very striking appearance, and cannot possibly be mistaken for any other inlet of this island. The land adjoining it forms the East extreme of Comptroller Bay; the point itself advances, and consists of steep, craggy rocks, that seem to have undergone some violent revolution, and a ship may approach within a mile of this headland, as well, indeed, as of the whole southern coast, without danger, as there is a depth of from 35 to 50 fathoms, over a fine sandy bottom. Shortly after a black rock appears in sight, about a quarter of a mile from Port Martin, which you leave on your right hand when Comptroller Bay opens upon you, lying North and South; and a little more to the westward is another smaller one. When Comptroller Bay is quite open you steer parallel with the coast, the direction of which is E.N.E. and W.S.W. for 5 or 6 miles, until you perceive a small island called *Mattau* (or *Mataou*, or the Sentinel?) not more than 30 fathoms from the East point of the entrance. Upon opening this narrow passage, you steer straight for the island, and pass directly

* *Annales Hydrog.*, tome ii., 1849, pp. 386-7.

† *Voyage of the Sulphur*, p. 353.

within about 100 or 150 fathoms of it, when Port Anna Maria lies immediately before you. On the West side of the entrance is another island of the same size as Mattau, and like it separated from the main land by a channel about 30 fathoms wide, and only navigable for canoes. This small island, called by the natives Mutonoe (*Motu-nui*, large island, a name given in derision for its small size), may be known by a rock that lies about 10 or 13 fathoms from it. The islands Mattau and Mutonoe form the entrance to Port Anna Maria, and care is necessary, both in entering and going out, not to approach too near to the westward island, or indeed to the westward shore, as an easterly wind, blowing even moderately, and a pretty strong current, render it dangerous. If there be a steady fresh breeze in the bay, the entrance is perfectly safe, and a vessel may near the coast on either side within 50 fathoms, or even still closer to the eastern side, nor is there anything whatever to render it the least dangerous: but with a moderate and unsteady wind, such as generally prevails in the bay, owing to the lofty mountains which surround it, no reliance must be placed on these unsettled breezes, which veer in one moment from East to West, now coming in violent gusts, and immediately after falling perfectly calm. Under these circumstances, it is necessary to warp, which mode of getting in and out of the harbour, notwithstanding it is so laborious, and, on account of the burning heat, so fatiguing, is the only one to be depended on. About three-quarters of a mile from the northern shore the bay stretches itself in an East and West direction; you then approach to about a quarter of a mile of a very prominent hill on the East shore, where the least uncomfortable landing-place will be found; and bring up in about 15 fathoms, mooring with your anchors in an East and West direction, and at the distance of half a mile from a small rivulet on the northern shore, where a supply of water may be procured. The East has a decided advantage over the other side, the currents not having the same effect upon the ship; and during our stay there of ten days, our cables were not once fouled, while the *Neva*, which lay on the West side, was obliged, almost every day, to clear her anchors.”*

To this account may be added the following:—*Tai-o-hae*, or as it is called by Krusenstern, *Tayo Hoae*, or *Anna Maria Bay*, is in the South part of *Nuka-Hiva*. It is sheltered from the trade winds. The breeze which sometimes blows from the South in the inner part of the bay is only a deflection of that which prevails outside. In the bad season preparation should be made against the very strong gusts which come from the mountains, from N.E. to E.N.E.

To reach the anchorage it should not be attempted before nine o'clock A.M. You will be exposed to meet with a calm or light breeze, with which vessels generally quit. After having ranged close to the *Sentinel* (*Mataou*?) on the East, *Point Arquée* is easily reached, but abreast of this point and further in the breeze is commonly irregular, and you must take advantage of its changes. In all cases you can anchor and haul in. It is important, particularly when the breeze is not up, not to approach the first point to the North of *Point Arquée*. Several ships have been carried on the rocks off this point by the effect of currents, the waves, or by light breezes.

* Krusenstern's Voyage, pp. 145—147.

In 1844 water was got from the river which fell into the sea near the king's house. Men-of-war generally did it by rolling the casks over the high beach.

To find the entrance of the bay you will see on the coast, which is perpendicular, a little to the right of the Eastern Sentinel, a white cross, one branch of which is vertical, and may at a distance seem like a cascade. The other branch is inclined to the horizon from East to West. The iron-wood trees which grow on the *Western Sentinel* (*Motu-nui*) will also point it out. High water, full and change, 3^h 50'; rise, 4 feet 6 inches.

Capt. Krusenstern says that the heavy surf rendered any accurate observations on the ebb and flood almost impossible, but it was ascertained that they changed invariably every six hours, the flood setting from the East. At full and new moon it is high water between four and five o'clock, the tide rising not more than 3 feet, but not well determined. Var. 4° 36' 30" E.

The position of the observations on the East side of the bay, which is, as before mentioned, the same occupied by the American Commodore Porter, in 1813,* H.M.S. *Sulphur*, and the French corvettes, *Astrolabe* and *Zélée*, is in lat. 8° 54' 3", lon. 140° 6' 40".

PORT TSCHITSCHAGOFF lies to the West of Port Anna Maria, and was visited and named by Capt. Krusenstern. At the entrance of the bay, the West side of which was formed by lofty and perpendicular rocks of a very wild but beautiful appearance, we found 20 fathoms water over a very fine bottom of sand and clay. As you advance on the East side there is another bay, apparently strewn with rocks, and quite exposed to the West, which occasions a very heavy surf. After passing the western point of this rocky bay, you open the finest basin that can be imagined; it lies in a N.E. and S.W. direction, is about 200 fathoms deep and 100 wide; at the bottom of it is an even sandy beach, and behind this a green flat resembling a most beautiful bowling-green. Streams of water flowed in various places from the mountains, and in a very picturesque and inhabited vale. Some distance to the North of the entrance, called *Schegua* by the natives, is a considerable river. This side being exposed to the wind, landing here is more difficult, but it is probable that at high water a boat could enter this stream.

The basin is so completely land-locked that the most violent storm would have scarcely any effect on the water, and a ship in need of repairs could not wish for a finer harbour for such a purpose. The depth for such is exceedingly convenient. Bananas, cocoa-nuts, and bread-fruit are superabundant, but animal provisions are scarce. The chief advantage of it is that you can anchor about 100 fathoms from the land, thus having the king's house and all the village under the guns of the ship, in case of an attack. Its chief fault is the narrow entrance, which in one part is only 120 fathoms wide, but is deep, so that you might easily warp out if the wind be moderate.† It lies in lat. 8° 57' S., lon. 139° 42' 15" W.

Lieutenant Hergest ran along the western shore, which he says is rocky and

* Nuka-Hiva is Porter's Madison Island; the bay is called Massachusetts, and their huts Madisonville, on the East side of Anna Maria Bay; and here the American captain made one of those unprovoked and unpardonable onslaughts on the unoffending natives. Those who may be interested in this should read the Quarterly Review, vol. iii., 1815, pp. 365.—410.

† Krusenstern's Voyage, p. 130.

iron-bound, without cave or bay. It had a verdant appearance, but no great sign of fertility, nor were any habitations or natives perceived. The N.W. side appeared to contain some small bays, and towards its N.E. extremity the land turns abruptly round, forming a bay something similar, but not quite so deep, as Comptroller Bay.

MOTU-ITI, or HERGEST ISLET, is a high rock elevated 130 feet above the sea. To the East there are two other white islets entirely deprived of vegetation, and much lower than Hergest Islet; they ought not to be approached too closely. Ingraham called them *Franklin Island*, and Roberts *Blake Island*, mistaking the for a single island.*

CLARK'S REEF could not be found by Admiral Du Petit Thouars in the assigned position, lat. $8^{\circ} 18'$, lon. $139^{\circ} 50'$. He sounded to 200 fathoms.

A LOW ISLAND exists E. 13° N., 15 or 18 miles from Fattuuhu or Chanal Island. It is in reality on a bank of coral and sand, raised 6 or 10 feet above the water, on which the sea breaks high. The shoal on which it stands stretches a long way to the West under water. Soundings on it were got from 6 to 55 fathoms.

HIAU (Krusenstern), HIAOU (Du Petit Thouars), was named by Lieutenant Hergest *Roberts Island*; by Marchand, *Masse Island*; by Roberts, *Freemantle Island*; and by Ingraham, *Knox Island*. It is much larger than the adjoining island, *Fattuuhu*, and like it is very high, 2,000 feet according to M. Tessan. It is more varied in its conformation.

Lieutenant Hergest says its shores are rocky, without any coves or landing places; and though its surface was green, it produced no trees, yet a few shrubs and bushes were thinly scattered over the face of the rocks; nor did it seem to be otherwise inhabited than by the tropical oceanic birds. These were in great numbers about it, and it seemed to be a place of their general resort. The N.W. side, however, had a more favourable aspect, and although its shores were also rocky, a number of trees were produced, as well on the sides of the hills as in the valleys. This side afforded some coves, where there is good landing, particularly in one near the middle; this, from the appearance of its northern side, was called *Battery Cove*. A little more to the North of this cove is a bay (*Cocoa-nut Bay*) which Lieutenant Hergest and Mr. Gooch examined; good anchorage and regular soundings were found, from 18 to 5 fathoms; the bottom a fine clear sand. An excellent run of fresh water discharged itself into the bay, near a grove of cocoa-nut trees: here they landed, and found a place for entering, &c. The landing was but indifferent, on account of the surf; but water is easily obtained.†

In the two valleys above alluded to the vegetation seemed more rich and active than in any other parts of the island. Besides these, between the peaks several plateaux covered with pine trees and verdure were seen. Notwithstanding its beauty and fertility, it is not inhabited. Without doubt there is water to be got in the entrance. It is about 6 miles in length N.E. and S.W.

FATTUHU (Krusenstern), FETOU-HOUHOU of Du Petit Thouars, is called

* Voyage of *La Venus*, vol. ii. p. 70; Krusenstern's Voyage, p. 141.

† Vancouver's Voyage, vol. iii. pp. 94-5; an account of the murder of Lieutenant Hergest and Mr. Gooch at Oahu, Sandwich Islands, in the same volume, pp. 96-7.

Chanal Island by Marchand ; by Ingraham, *Hancock Island* ; and by Roberts, *Langdon Island*. It is very much smaller than Hiau, being about 4 miles in length, and not more than one in breadth. It is very steep, its coast seeming to arise perpendicularly from the sea. It is covered with a vegetation which cannot be compared to that of Dominica ; but it is incorrect to call it barren. At the North point of this island there is a large high islet, at a short distance from the shore ; it lies W. 13° S. from the bank awash. The South point of Hiau is low ; some detached and low rocks show themselves, which seemed to those on board *La Venus* to extend some distance beyond the visible rocks.

In the channel separating Hiau from Fattuuhu some thought they saw a breaker, but this fact was not absolutely established ; in the consequent doubt it would not be prudent to attempt the passage.

These two islands have an abundance of fish and sea-fowl, which the natives of Nuka-Hiva and Roapoa come from time to time to enjoy. These islands are thus like what Teturoa is to Tahiti, a place of resort for the licentious tribes, who come hither to give themselves up to gluttony and debauchery.*

DETACHED ISLANDS AND SHOALS BETWEEN THE EQUATOR AND LATITUDE 10° S.

Following the previous plan, in this belt of latitude we commence to the westward of the Marquesas Islands. The space comprised within these latitudes, and between the Galapagos Islands and those last named, has not a single point of land or shoal hitherto discovered.

NEW YORK AND NEXSEN ISLANDS.—On May 31, 1798, Mr. Fanning relates that after quitting Nuka-Hivah, in the ship *Betsy*, land was made to the N.E. As it was neared it appeared to be two islands ; one high and of considerable extent, and the other a low island. The first was named New York Island, and the second Nexsen Island, after his friend and owner, Mr. Elias Nexsen. Numerous smokes showed them to be inhabited, but as they were passed at 4 to 6 leagues' distance they were not examined. At seven hours after first seeing them, the lat. was 8° 13' S., lon. 141° 31', New York Island bearing E. by N. 8 leagues.†

This would make the lat. about 8° 9' S., lon. 141° 30½' ; but the vagueness of the account, and the remoteness of the period, render it very probable that they are identical with Hiau and Fattuuhu, last described.

TIBURONES.—Capt. D'Urville inquired concerning *Tiburones* at Uapoa, and was unhesitatingly assured of its existence, and that their inhabitants sometimes visited it. They stated that it was high land, and on all its coast there was but one small sandy beach, where their canoes could land in fine weather. At that time (August, 1838) there was a single native on it, deserted by his com-

* Voyage of *La Venus*, vol. ii. pp. 368-9.

† Fanning's Voyages, pp. 217, 218.

panions. It was about 50 leagues, or a day and a half's sail, from Uapoa.* On the charts it is placed in lat. 11° S., lon. 143° W.

CAROLINE ISLAND, THORNTON ISLAND.—In 1795 Capt. Broughton saw an island in lat. $9^{\circ} 57'$ S., lon. $150^{\circ} 25'$ W. He passed it at the distance of 5 leagues; and as it is very low, he might readily be mistaken as to its actual size. He named this *Caroline Island*.

Capt. Thornton, commanding the English whaler *Supply*, in his passage from Peru to Australia, discovered, in lat. $10^{\circ} 4'$ S., lon. $150^{\circ} 16'$, a very low island, which at first sight had the appearance of a small group of islands. He estimated their length to be 5 leagues, and breadth 5 miles.

The close proximity of these two positions renders it most probable that they are identical, notwithstanding that *Thornton Island* is stated to be nearly three times the size of that seen at the distance by Capt. Broughton.†

VOSTOCK ISLAND was discovered by Capt. Bellingshausen in 1820. It is not more than half a mile in diameter. His position, lat. $10^{\circ} 5' 50''$ S., lon. $152^{\circ} 23'$, was confirmed by the United States' Exploring Expedition, who place it on their charts as *Staver's Island*, discovered by Capt. Cash. It is also identical with *Anne Island*. Wilkes describes it as a low sandy island, with a lagoon. It is well wooded, half a mile in diameter, of an oval shape, with heavy breakers surrounding it. Landing impossible.‡

MALDEN ISLAND, discovered by Lord Byron in H.M.S. *Blonde*, in 1825, is a low coral formation, about 12 or 14 miles in extent, and having on it several clumps of thick fresh-looking trees, so compact that at a distance they were taken for rocks; these clumps are useful in approaching the land, for in no place is it higher than 40 feet. Landing was easy, but shoals of bold sharks rendered it rather dangerous. No inhabitants were found on it by the *Blonde*, but traces of former people were seen—large square areas, raised 3 feet above the ordinary surface, supported by blocks of wrought coral, and each having in the centre what may be taken for an altar or tomb, similar to Capt. Cook's description in other islands. It was named after the surveying officer of the *Blonde*, Lieutenant Malden. There is fresh water in it. Lat. 4° S., lon. 155° W.§

STARBUCK ISLAND was also discovered by Lord Byron, in 1825. It is placed by some in lat. $5^{\circ} 58' 30''$ S., and lon. $155^{\circ} 58'$ W. Arrowsmith places it in lat. $5^{\circ} 24'$, and lon. $155^{\circ} 50'$. It is most likely identical with *Volunteer Island*, discovered, in 1823, by the *Eagle*, an English whaler, said to be in lat. $5^{\circ} 9'$ S., lon. $155^{\circ} 18'$.||

* Voyage au Pole Sud, tome iv. p. 23; Capt. Du Petit Thouars sought for it without success. See Voyage of *La Venus*, vol. ii. pp. 372-3.

† Voyage to the North Pacific, by Capt. Broughton and Krusenstern, vol. ii. p. 434.

‡ Krusenstern's Supplement, pp. 4, 78, 158; Wilkes, vol. iv. p. 277.

§ Voyage of the *Blonde*, pp. 205-6.

|| Mr. Purdy; Krusenstern, Supplement, p. 16; Voyage of the *Blonde*.

PENRRHYN ISLANDS were discovered, in 1788, by the vessel *Penrhyn*, at the distance of 8 miles. Kotzebue was the next navigator who saw them, April 30, 1816. He describes the natives as greatly resembling those of the Washington (Marquesas) Islands. This comparison, however, is not confirmed by the remarks of the United States' Exploring Expedition in 1840, which follow :—

The *Porpoise* next passed over the supposed site of Tienhoven Island without seeing any signs of land, and thence N.W. across two positions assigned to Penrhyn's, examining particularly that given by Capt. Cash, in lat. $9^{\circ} 58' S.$, and lon. $158^{\circ} 14' W.$ No island, however, was seen. Proceeding farther to the N.W., they, on the 15th, discovered land, which proved to be Penrhyn Island, about 80 miles West of its place on Arrowsmith's chart. It was of the usual coral formation, low, and densely covered with trees, among which the cocoa-nut was the most conspicuous.

The natives came off to the ship, and were the wildest and most savage-looking beings that had been met with, vociferating in the loudest and most frightful manner as they clambered fearlessly up the sides; they were naked, except the maro. Their weapons were concealed. Their language could not be understood.

The island was by estimate 50 feet high, and was found to be 9 miles long, N.E. and S.W., and about 5 miles wide, with an extensive lagoon, having in it many coral patches; there is a boat entrance into it. On the N.W. side there appears to be a continuous village, with cocoa-nut groves throughout its whole extent, and the island is evidently very thickly peopled. The ferocity of the savages precluded the possibility of attempting a landing.

The island is believed to afford some tortoise-shell and pearls, but the ferocious and savage disposition of the natives would require traders to be strongly armed.*

Admiral Krusenstern considers that *Bennett Islands*, seen in 1832, in lat. $8^{\circ} 35' S.$, lon. $159^{\circ} 55' W.$, are identical with Penrhyn Islands.†

JARVIS ISLAND is a small coral island, triangular in shape, $1\frac{1}{2}$ miles East and West, and a mile North and South. It exhibits the appearance of a white sand-beach, 10 or 12 feet above the sea, without a tree or shrub, and but a few patches of grass. The sea breaks violently around it, but no reef extends to any distance from it, and it may therefore be closely approached. A few sea birds were seen about it, and it was considered very dangerous. Lat. $0^{\circ} 22' 33'' S.$, lon. $159^{\circ} 54' 11'' W.$ ‡

Several islands and reefs have been announced as existing in this neighbourhood, but none of them were seen by the American Exploring Expedition. The first of these, as regards position, must be the same as Jarvis Island. It was discovered by Capt. Brown, of the English ship *Eliza Francis*, August 21, 1821; it is a small island, 5 miles in circumference, covered with bushes, in lat. $0^{\circ} 23' S.$, lon. $159^{\circ} 46' W.$ §

* Narrative of the United States' Exploring Expedition, vol. iv, pp. 277—280.

† Supplement, p. 159.

‡ Wilkes's Narrative, vol. v. p. 4.

§ Letter from M. Blosseville to Admiral Krusenstern, Supplement, p. 22.

Bunker Island, an American discovery, is also most likely identical with these. It is small. In this case another island, called *Brocke Island* by the Americans, must exist a short distance from Bunker or Jarvis Island, in lat. $1^{\circ} 13' S.$, and lon. $159^{\circ} 30' W.$, or, corrected from Wilkes's position, $159^{\circ} 40' W.$

BOWDITCH ISLAND, or FAKAAFO, was discovered by the U.S. discovery-ship *Peacock*, on January 28, 1840. It is of coral formation, and its shape is that of a triangle, with the apex to the South. From North to South it is 8 miles long, and in width from its West point 4 miles. On its S.W. and North points it is of considerable elevation, and the more elevated parts are connected by a coral reef, which is awash. On the East side the land is more continuous, and on these parts there are extensive groves of cocoa-nut trees and a shrubbery. There is no entrance for a vessel to the lagoon, which, from the appearance of the water, has but little depth. The party landed on an islet in the S.W. part, which the natives called *Fakaafo*; it was covered with cocoa-nut trees, but had no houses on it. The town is opposite the islet, and here water was procured from a carefully kept well. The natives appeared unacquainted with Europeans and with the use of fire. Lat. $9^{\circ} 20' S.$, lon. $171^{\circ} 4' W.$ *

DUKE OF CLARENCE ISLAND, or NUKUNONO, was discovered by Capt. Edwards, of the *Pandora* frigate, in 1791. It was surveyed by the American Expedition, and found to be $7\frac{1}{16}$ miles in length in a North and South direction, and 5 miles wide East and West. It is of a triangular form, with the apex to the North. It has a lagoon similar to that of the Duke of York Island, with islets in it; the N.W. side is a bare reef awash, on which the sea breaks heavily. Many cocoa-nut and other trees on it. It is said to be inhabited, but no communication could be effected. Its North point is in lat. $9^{\circ} 5' S.$, lon. $171^{\circ} 38' W.$

DUKE OF YORK ISLAND, or OATAFU, was discovered by Commodore Byron, in 1766, who, however, does not give the position in his narrative. He said it was uninhabited. Wilkes surveyed it in 1840. It is a lagoon island of coral formation, 3 miles long East and West, and $2\frac{1}{2}$ wide North and South. There is no passage into the lagoon; the sea breaks on the reef with violence, but at high water a boat may pass over without difficulty, if proper care is taken. The islets that have been formed on the reef are 8 or 10 feet above the water, and are covered with cocoa-nut and pandanus trees. It is now inhabited; the village, which was visited, was on the inner or lagoon side of the island; the population was vaguely estimated at 120. They have no water; the supply is wholly obtained from excavations made in the body of the cocoa-nut trees 2 feet from the ground. These trees are all dug out on the lee side, towards which all are more or less inclined. The natives acknowledge subjection to the chief of Fakaafo or Bowditch Island.†

These last three islands are collectively called the *Union Group* on the American charts.

* Wilkes, vol. iv. pp. 16—18.

† Hawkesworth's Collection, vol. i.; Wilkes, vol. v. pp. 5—8.

PHŒNIX GROUP.

This appellation is applied to a scattered number of islands, from the name of one of its members, by the United States' Exploring Expedition. It is somewhat singular, however, that the Phoenix Island is one of which the existence is supposed to be disproved by their examination. The six or seven islands composing it are as follow.

ENDERBURY'S ISLAND is placed by Wilkes in lat. $3^{\circ} 8' S.$, lon. $171^{\circ} 8' 30'' W.$ It is of peculiar appearance for a coral island. It is 3 miles long by $2\frac{1}{2}$ wide. Its South end is the widest, and on it are two clumps of stunted shrubs and plants; the southern end is almost bare of vegetation, and here its dry lagoon is most apparent. The bottom of this lagoon is composed of coral slabs, now broken up in all manner of ways, and is in places below the level of high water. The greatest height of the island above the shore reef is 18 feet. On the *West* side of the island was found a quantity of large drift-wood, in such a way as to indicate a great rise of water at times.*

BIRNEY'S ISLAND was discovered by Capt. Emmet, who also discovered Sydney Island. According to Capt. Wilkes, it is in lat. $3^{\circ} 34' 15'' S.$, and lon. $171^{\circ} 33' W.$ It is only a coral island, 6 feet above the sea, about one mile long, N.W. and S.E., and a quarter of a mile wide. It is but a strip of coral, apparently uplifted, and is exceedingly dangerous for vessels.†

ARTHUR ISLAND, placed by Arrowsmith in lat. $3^{\circ} 30' S.$, lon. $176^{\circ} 0' W.$, requires confirmation as to its existence and position.

From the information received by Wilkes, at Hull's Island, there exists *only two* islands to the northward. These would be therefore Enderbury's and Birney's Islands. Phoenix Island, Farmer Island, and Favourite Island, are with Enderbury's and Mary Bulcot Islands. Mary or Roberts' Islands are the same as Birney's Island.‡

GARDNER or KEMIN'S ISLAND is placed by Krusenstern among the doubtful islands, but has been fixed by Wilkes's Expedition, lat. $4^{\circ} 37' 42'' S.$, lon. $174^{\circ} 40' 18'' W.$ It is a low coral island, with a shallow lagoon. Birds were numerous and very tame. A large rat was found (perhaps indicative of water). Trees 40 feet high, but no underwood; visible 15 miles. The flood sets strong to the northward; rise and fall of tide, $4\frac{1}{2}$ feet; var. $7^{\circ} 26' E.$ (1840.)§

M'KEAN'S ISLAND was discovered by Wilkes, in lat. $3^{\circ} 35' 10'' S.$, and lon. $174^{\circ} 17' 26'' W.$ It is of coral and sand blocks, 25 feet high, no trees or bushes. Three-fourths of a mile long, by half a mile broad.||

HULL'S ISLAND, the N.W. point of which is in lat. $4^{\circ} 29' 48'' S.$, lon. $172^{\circ} 20' 52'' W.$, was discovered by Wilkes, August 26, 1840. It is a lagoon island, and has a little fresh water, and a few cocoa-nut trees upon it. They were surprised at finding eleven Tahitians with a Frenchman on it, catching

* Wilkes, vol. iii. p. 370.

† Wilkes, vol. v. p. 4; see also Mr. Purdy to Admiral Krusenstern, Supplement, p. 22.

‡ See also Krusenstern, Supp. pp. 22, 159.

§ Krusenstern, Supp. pp. 19, 157; Wilkes, vol. iii. p. 368.

|| Wilkes, vol. iii. p. 360.

turtle, of which they had taken seventy-eight in five months; it offers, therefore, but few inducements to visit it.*

SYDNEY ISLAND, according to the people found on Hull's Island, lies 60 miles to the East of the latter. Upon Norie's chart there are *two* islands, 25 miles apart, in this relative situation, so that Wilkes's discovery is not altogether new. His appellation, however, may be retained to the former.

ELLICE'S GROUP.

This is the name of one of the islands, or rather subordinate groups of a range of islands, which extends in a N.W. and S.E. direction for 300 miles. The name has been applied to the whole range in the chart drawn up by the American Exploring Expedition, and as it may be serviceable, it is here repeated without any reference to the appropriateness of the general term.

INDEPENDENCE ISLAND is an American discovery; its position has been more definitely determined by Mr. Bennett, as lat. $10^{\circ} 41' S.$, lon. $179^{\circ} 15' E.$, February 19, 1830.† The island seen by Capt. Mattinson, in January, 1826, in lat. $10^{\circ} 30'$, and lon. $179^{\circ} 50'$, is doubtless the same as Independence Island. It is a small wooded island of 2 or 3 miles in circumference. At the distance of 4 miles to the N.E. of the island is a coral bank, the depth on which is from 12 to 15 fathoms.‡

SOPHIA ISLAND, in lat. $10^{\circ} 45' S.$, lon. $179^{\circ} 20' E.$, is said to be sufficiently high to be seen 20 miles off.

ELLICE'S GROUP is an extensive ring of small islets, situated on a coral reef surrounding a lagoon. They are so far separated as to give the idea of distinct islands, which has led to the name of *group*, applied to them. They are well covered with cocoa-nut and other trees, which give them a sufficient elevation to be seen at 10 or 12 miles' distance. The connecting reef is awash; there are two openings in its West side, and an island off its S.W. point, at the distance of a mile, 5 miles long and 2 wide. The group is 13 miles long in a N. by E. and S. by W. direction, and $7\frac{3}{8}$ miles East and West. The natives, considered to be 250 in number (1840), call it *Fanafute*, speaking a pure Polynesian dialect; they are familiar with white men. There appears to be good anchorage within the lagoon; an abundance of wood is to be had; but it is believed that there is not an adequate supply of fresh water.

They were discovered by Capt. Peyster, in the American ship *Rebecca*, March 18, 1819. He named one on which he was nearly wrecked *Escape Island*; the southernmost, *Rebecca Island*, from his vessel; and the West, *Brown Island*. They were seen by Wassilieff in 1821, but were not seen by Chramtschenko in 1829, though their position was well ascertained, as confirmed by the American surveyors, lat. $8^{\circ} 30' 45'' S.$, lon. $179^{\circ} 13' 30'' E.$ §

PEYSTER'S GROUP or ISLAND was discovered by the *Rebecca*, on her voyage from Nuka-Hiva to the East Indies. The natives call it *Nukufetau*. It is

* Wilkes, vol. iii. p. 370.

† U. S. Journal; Krusenstern's Supplement, vol. ii. p. 435.

‡ Krusenstern's Supplement, pp. 9, 10.

§ Wilkes, vol. v. p. 40; Horsburgh; Krusenstern's Supplement, p. 9.

8 miles long E.N.E. and W.S.W., and its greatest width is nearly the same. There is a good ship channel into the lagoon, one-third of a mile wide, least depth 5 fathoms. It leads to an anchorage in 17 to 20 fathoms, sandy bottom, where a vessel may lie well protected by the reef.

The extreme North island is placed by Wilkes in lat. $7^{\circ} 56' 11''$ S., and lon. $178^{\circ} 27' 32''$ E.

TRACY'S ISLAND was placed by Admiral Krusenstern among the doubtful islands, but the position in which it was found by the U.S.S. *Peacock* is exactly that given in the memoir of Mr. Reynolds, and is the same as the *Achilles Island* of the chart. Its native name is *Oaitupu*. It is well covered with trees, and to all appearance as extensive as Peyster Island.

LYNX ISLAND is a small island, which has no lagoon. It is placed by Wilkes in lat. $6^{\circ} 10'$ S., lon. $177^{\circ} 41'$ E., and was named by him *Speiden Island*; but the former must remain.

NETHERLAND or EEG ISLAND was discovered, June 14, 1825, by the Dutch frigate *Maria Reigersbergen* and the corvette *Pollux*. The Russian captain, Chramtschenko, ignorant of the Dutch discovery, named it *Löwendahl Island*, in 1829, and placed it in lat. $7^{\circ} 13' 20''$ S., and lat. $177^{\circ} 14' 30''$ E., or $6'$ more S. and $20'$ W. of the Dutch position. The form of the island is that of a crescent, having an extent of $4\frac{1}{2}$ miles North and South. Its breadth is less than a mile, and its height (to the tops of the trees?) about 80 feet.*

GRAN COCAL ISLAND was discovered with St. Augustine Island on the 5th and 6th of May, 1781, by the Spaniard Maurelle. His longitudes have been shown to be very defective; his positions, therefore, cannot be depended on here. But from his description it was recognised by Capt. Duperrey, who places its centre in lat. $6^{\circ} 5'$ S., lon. $176^{\circ} 13'$. Capt. Chramtschenko places it $7\frac{1}{2}$ miles farther South (or $6^{\circ} 12' 30''$), and in the same longitude. According to Maurelle, El Gran Cocal is small, low, embarrassed with reefs and covered with rocks.

On March 24, 1840, the U.S. surveying ship *Peacock* fell in with an island which they place in lat. $6^{\circ} 19'$ S., lon. $176^{\circ} 23' 15''$, and which was named *Hudson Island*. This is 12 miles to the S.E. of the position assigned by Chramtschenko to Gran Cocal; yet from the *Peacock's* track afterwards, if the latter exists in the former situation, it ought to have been seen. Can, therefore, Gran Cocal and Hudson Island be identical? In 1809 the *Elizabeth* discovered two islands here, which are those in question, naming the one under consideration *Sherson's Island*.†

According to Capt. Wilkes's account, *Hudson Island* is $1\frac{1}{4}$ miles in length North and South, and nine-tenths of a mile wide East and West. It is inhabited, and is of coral formation; has no lagoon; has cocoa-nut trees, which can be seen about 8 or 10 miles. There are reefs extending from its North and South points, nearly half a mile, on which the sea breaks heavily.

ST. AUGUSTINE (of Maurelle, 1781) is the *Taswell's Island* of the *Elizabeth*, 1809. Duperrey places it in lat. $5^{\circ} 39' 10''$ S., and lon. $176^{\circ} 6'$ E. Capt. Wilkes makes it 4 miles farther to the North. It is small and well wooded.‡

* Krusenstern's Supplement, p. 9.

† *Ibid.*

‡ Wilkes, vol. v. p. 44.

The GILBERT ARCHIPELAGO (which will be described in a subsequent part of this volume) lies to the northward of this group, the distance between the extremities of the two archipelagoes, St. Augustine and Hope or Hurds Island, being about 180 miles.

But it seems probable that some land intervenes in this space, for Kotzebue passed over this space in his second voyage. "From lat. 5° S. to the equator we daily perceived signs of land. When in lat. $4^{\circ} 15'$, and lon. 178° , heavy gales brought swarms of butterflies and small land birds to the ship. We looked in vain for land, therefore this discovery remains for some future navigator."*

JESUS ISLAND was discovered by Mendaña in the year 1567, placing it in lat. $6^{\circ} 45'$, and 160 Spanish leagues from the Baxas di Canselaria. Krusenstern places it in the list of his doubtful positions, in lat. $6^{\circ} 45'$ S., lon. $171^{\circ} 30'$ E.†

NAMELESS ISLAND is another doubtful position, lat. $2^{\circ} 50'$ S., lon. $170^{\circ} 18'$ E.

PAANOPA or OCEAN ISLAND was discovered in 1804 by the vessel of the same name. It is of a circular form, high in the centre; has no harbours or anchorage, and is steep to all round, clear of hidden dangers. It is about 10 or 15 miles in circumference, and thickly inhabited by a race similar to those of Pleasant Island. In November, 1845, there were seventeen white men living on shore, several of whom were runaway convicts from New South Wales or Norfolk Island. Cocoa-nuts and fowls may be obtained at this island at a moderate price; but strangers should be on their guard against treachery, more especially at islands where reprobate white men are found domesticated with the natives. The island can be seen 25 miles distant in clear weather.‡

M. Dutailis says that vessels in need of refreshments cannot get water here; they may increase their crews, and get what they require, keeping under sail. The north part of the island is scarcely approachable. The beach is backed by a cliff 15 or 20 feet in height. The South part, on the contrary, slopes towards the sea, and is intersected by sandy beaches, favourable for landing and launching the slender and beautiful canoes of the island, which was probably in former times healthy and prosperous, but now overcome by evils: the inhabitants, 450 in number, have fresh wants, which cannot be easily satisfied.§

The position is given in the Nautical Magazine as lat. $0^{\circ} 48'$ S., lon. $169^{\circ} 49'$ E.; but M. Dutailis says—its centre is in lat. $0^{\circ} 52' 2''$ S.; lon. $168^{\circ} 24' 25''$ E.; variation, $12^{\circ} 23'$ E.

MATTOETEE (*Motu-iti?*), or KENNEDY'S ISLAND, was discovered by the *Nautilus* in 1801: it is stated to be in lat. $8^{\circ} 36'$ S., lon. $167^{\circ} 50'$ E.; but the position requires confirmation.

* New Voyage, vol. i. p. 292,

† See Krusenstern's Memoirs, p. 22; Supplement, p. 19; Burney's Chronological History, &c.

‡ Nautical Magazine, November, 1848, p. 578.

§ M. Dutailis, *Annales Hydrographique*, tome i. p. 157.

PLEASANT ISLAND was discovered by Capt. Fearn, in the *Hunter*, 1795, and is probably the *Shank's Island* of 1801. According to observations made in 1845, it is in lat. $0^{\circ} 25' S.$, lon. $167^{\circ} 5' E.$ It is 15 miles in circumference, rather low, covered with cocoa-nut trees, and of a circular form. Capt. T. B. Simpson makes it in lat. $0^{\circ} 35' S.$, and, according to his dead reckoning, it may be $15' W.$ of its assigned position. A fringing reef projects from the shore about 200 yards all round the island. It has neither harbour nor anchorage, is steep-to on all sides, and clear of hidden dangers. On approaching it two round hummocks, some distance apart, are first visible; and, as it is approached from the S.E., a very remarkable solitary tree, towering above all others, makes its appearance on the East extremity of the island. It is thickly peopled by a good-looking race of a light copper complexion; to a stranger, they appear inoffensive in their manners; but, notwithstanding their mild appearance, they are not to be trusted, as they succeeded in cutting off a whale-ship at this island, some years ago, it is said through the aid and instigation of some runaway convicts. A good supply of cocoa-nuts and poultry may be obtained at this island. Vessels touching here should be on their guard and not allow many natives on deck. There were two white men living on this island in 1845.*

CHAPTER XXX.

SALOMON ISLANDS, NEW GUINEA, ETC.

I. SALOMON ISLANDS.

It is to the celebrated Mendaña, frequently alluded to in this work, that the honour of discovering this archipelago is due.

On the 10th of January, 1567, Don Alvaro de Mendaña left Callao in two ships (whether more is not specified), and after discovering a small island, Jesus Island, they came upon some reefs, Baxos de Candelaria (Candlemas Shoals), and thence sailed until they came to a port, Sta. Ysabel de la Estrella (St. Isabella of the Star), on a land of great extent. It was inhabited by a race of the complexion of the Mulattoes, who live on cocoa-nuts and roots apparently, but it was believed without much animal food, for the chief sent to the general a present of a quarter of a boy, with the hand and arm; this was immediately buried, which gave great offence. At this port they built a brigantine, and in it Pedro de Ortega and Hernan Gallego were sent to make further discoveries, which included great part of these islands.

The name, Salomon Islands, would appear had been applied to some earlier

* Nautical Magazine, November, 1848, p. 577; Krusenstern, vol. i. p. 20.

discovery, but subsequently it was given to the whole of the group, "to the end that the Spaniards, supposing them to be those isles from which Solomon fetched gold to adorn the temple at Jerusalem, might be the more desirous to go and inhabit the same."* But they were not revisited by Europeans till two centuries after their discovery.†

Their position and real character remained uncertain till Carteret, in 1767, in sailing from Lord Egmont or Santa Cruz Island for New Britain, discovered Gower, Carteret, and Simpson Islands, without suspecting that they formed a portion of the much-vaunted Salomon Islands. The voyage of Surville, in the *St. Jean Baptiste*, in 1769, first put an end to the uncertainty of the calculations made for their situation, which varied more than one-third the breadth of the Pacific. Bougainville, who followed Carteret, that is, in 1768, discovered the northern part of the islands, which had not been seen by Mendaña, and thus were not recognised. These facts were first arranged, and the arguments cleared up, by the labours of Buache and Fleurieu.‡

In 1788, Lieutenant Shortland, leaving Botany Bay with four ships bound for England, also sailed along several of the islands, and made numerous discoveries.§

Since this period the only exact knowledge we have had is that given from the cursory examination made, under sail, by the celebrated and unfortunate Admiral D'Urville, in his last voyage in the *Astrolabe*, in 1838. The combination of all these accounts, however, give but a very imperfect picture of a country which might be of considerable importance to the world.

The *Salomon* || *Archipelago* extends N.W. and S.E. for the space of 200 leagues. It is composed of eight or ten principal islands, and many others less considerable, but the number of which is not yet properly known.

The structure of these islands is throughout the same; it is a long chain of mountains, often very lofty, which form their axes in the general direction of the group. On either side the slopes incline gently towards the sea; the shores generally appear low, and often furnished with a belt of mangroves, the edge of which is washed by the salt water. An active and vigorous vegetation covers the whole of the land, and it is only here and there that in rare intervals the soil may be seen, or only covered with ferns, or often consumed by fire intentionally. The principal islands have all the advantages of extensive land; extended plains and large rivers descend from the hills; and if we may judge by the trees which cover the land, the soil is of great fertility.

If generalities may be concluded from a few isolated remarks, it may be asserted that rain is most abundant, and that the scorching climate is tempered by this means.

The population of the Salomon Islands appears to be very irregularly distributed on the islands composing the archipelago, for while Christoval, Bougainville,

* Lopez Vaz, in Hakluyt, vol. iii. p. 802.

† The account of the discovery and a disquisition thereon will be found in Burney's *Chronological History*, vol. i. chap. xvi. p. 277, *et seq.*

‡ *Découvertes des Français en 1768 et 1769, par Fleurieu.*

§ See *Voyage of the Governor Philip to Botany Bay* for the account of this voyage.

|| In numerous works we find this word spelt Solomon, as in our own vernacular rendering; but as in the original accounts it is always spelt Salomon, this way ought to be retained.

and Bouka are apparently well inhabited, Malayta, Ysabel, and Choïseul, seem to have much fewer than their lands would afford sustenance for. The population does not appear to be confined to the sea-shore only; their houses, placed up to the top of the mountains, indicate a considerable interior population. It would be impossible at present to estimate their number. The character of the natives is very difficult to fix, for though they may be generally alike, still they differ much in different parts of the archipelago. They are in general small and weak, though well built; those of Ysabel are ugly and miserable compared with those of Bougainville. Their skin is of the black tint which characterizes the Oceanian negro. All former accounts seem to unite in giving them the character of great perfidy and ferocity, but D'Urville does not state this to be his experience. Perhaps the terror inspired by his ships and cannon may have subdued them in some degree; but in the interviews the crew had with the natives at Ysabel, they appeared to be the only savages they had seen who had any sentiment of gratitude.

The productions of these islands are those of all the torrid zone; there are but few plantations among these barbarous people, and of their capabilities we know but little.

The following observations on the winds, &c., have been given by M. Dutailis:—

“Rear-Admiral D'Urville, in his exploring voyage, found the westerly winds regular at the Salomon Islands during the month of November, and remarks upon their extraordinary duration. I can add that they generally commence in the month of September, and continue until the month of March.

“After they have set in for some time there is a very strong current between this archipelago and those of Santa Cruz, Mendaña, &c. We have found it, at times, to be above 40 miles in the twenty-four hours, and setting invariably to the E.N.E. or N.N.E., according as we were nearer or farther off the Island of San Christoval.

“In these parts, as well as in Torres Strait, the gales of wind from the western quarter are very violent. During our stay at San Christoval, under shelter, from 15th to 17th February, 1848, the same gale was felt all over New Caledonia. Two vessels were driven ashore on the Island of Lifu (Chabrol), at the anchorage of Gaïtcha, and the ship *Arche-d'Alliance* lost her rudder at the same time, in lat. 12° S., and lon. 158° E.” *

The force of the *currents* has been also described by Capt. Le Mignon, of the *Jupiter*, in April, 1846.

“From Mitre Island to the eastern cape of San Christoval we had each day a current of 24 or 25 miles to the East; from the 16th to the 22nd we continually sailed with terrible weather from the S.E. to N.E. We kept within sight of the high lands of the Salomon Archipelago, and reached, on the 17th, near Bougainville Island, where we met with calms, storms, and violent squalls, much to be dreaded on account of their irregular direction. To the South of the Salomon Archipelago we experienced as much as 45 miles of current, bearing to the

* Annales Hydrographique, 1849, tome i.

South, in the twenty-four hours, and 35 to 40 miles of easterly current. We here met with some enormous trees, capable of sinking a ship should they strike her."

In conclusion of these preliminary remarks, it may be stated, that the charts of the Salomon Islands are very defective, especially on their southern side; and before any confidence can be used in sailing among them, they must be surveyed. Merchant ships passing through the archipelago should not hold any intercourse with the natives, as they are not to be trusted, and this would render any accident doubly disastrous.

SANTA CATALINA is the southernmost of the Salomon Islands. The island cannot be perceived more than 10 or 12 miles distant. Both this and Santa Anna are much wooded, and covered, near the shore, with a forest of cocoa-nut trees. Their canoes are admirable for their lightness and grace; manned by only four natives, they easily kept up with the ship, going at the least at the rate of 4 knots.*

SANTA ANNA ISLAND, according to D'Urville, is in lat. $10^{\circ} 49' 0''$, and lon. $162^{\circ} 31'$; its summit is 500 feet above the sea. The Island of Santa Anna, perhaps, may be seen at 25 or 30 miles off. It is inhabited on its eastern part, where a very large village may be seen.

These two islands were discovered by Mendaña, as has been demonstrated by Fleurieu, and are the same as the *Iles de la Délivrance* of Surville. Lieutenant Ball, thinking them to be a fresh discovery, named Sta. Anna as *Sirius Island*, and the other as *Massey Island*.†

SAN CRISTOVAL ISLAND, or AROSSI, is the first of the larger islands in coming from the S.E. Its southern side was examined by D'Entrecasteaux, and its north-eastern side by D'Urville, in 1838. From the observations then made, the island appears to be 73 miles long from N.W. by W. to S.E. by E., its greatest breadth being 23 miles.

"This island, perhaps, may be visible at more than 60 miles. The open part of it to the S.W. is a series of bays and coves, from out of which may be seen issuing, when sailing along the coast, a great number of canoes, which are remarkable for their lightness, and the velocity with which the natives impel them.

"The whole country is well wooded; the tamanou attains such dimensions that trunks squaring 3 feet 6 inches may be procured. M. Dutailis made a stock to a large anchor."

CAPE SURVILLE, as it is called by Fleurieu, after its discoverer, is in lat. $10^{\circ} 50' 40''$ S., lon. $162^{\circ} 25' 14''$ E., and is the eastern extremity of a long narrow peninsula. The coast of San Christoval, to the northward of this, D'Urville says is well peopled, and has a very pleasant aspect. Clumps of cocoa-nut trees abound, and under them are a great number of small huts and stages supported on wooden columns. Extensive forests cover the land, which rises from the shore to the summit of the mountains in the form of an amphitheatre. The height of these mountains was 1,614 and 1,552 feet. A line of breakers reaches off the coast all along, but rarely extends more than half a mile.

CAPE KRIECK is a projecting point; to the West of it is an extensive bay;

* M. Dutailis, *Annales Hydrographique*, 1849, tome i. p. 158.

† Hunter's *Historical Journal*, p. 419.

the bottom of which seemed to be a country of the richest description. A vast plain, covered with cocoa-nut trees, runs inland between two chains of high mountains. There was no doubt but that some river flowed through this.

ILES DU GOLFE are two in number, the largest is tolerably high, and is in lat. $10^{\circ} 15' 0''$ S., lon. $161^{\circ} 45' 40''$ E. They were discovered by Surville. They are neither of them of any extent, and are entirely covered with a rich vegetation, but without cocoa-nut trees. The inhabitants were seen, and some canoes put off, but did not reach the corvettes. The channel between these two islands and the shore was broad and apparently deep and quite safe; but it was not examined.

The *Trois Sœurs* (Three Sisters) lies to the West of the Iles du Golfe, and was also discovered and named by Surville.

CAPE RECHERCHE is the northernmost point of San Christoval. D'Urville places it in lat. $10^{\circ} 12' 0''$ S., lon. $161^{\circ} 22' 44''$ E. This position is identical with that of D'Entrecasteaux, who named it.

CONTRARIETE'S ISLAND is not very well determined. It was seen at a distance by D'Urville, and also by its discoverer, Surville. The summit is in about lat. $9^{\circ} 51'$ S., lon. $162^{\circ} 0'$ E. Some of the natives, a fine race, came on board D'Entrecasteaux's ship, but did not seem inclined for much conversation.*

The country near to Cape Recherche appeared to be thickly inhabited; a great number of huts and stages were built beneath superb clumps of cocoa-nut trees. The natives who came off in their canoes seemed to have a great dread of fire-arms.

The S.W. side of San Christoval is thus described by D'Entrecasteaux, commencing at Cape Surville:—

The portion of coast which we had run along during the day trends nearly due West for the space of 4 leagues, then it takes a W.N.W. direction, then N.W. $\frac{1}{4}$ W. It presents to the view a great number of tolerably deep bays, but they are all open to the southerly winds. To the West of *Cape Sydney* (lat. $10^{\circ} 46'$ S., lon. $162^{\circ} 8'$ E.), however, a bay was seen, which opened to W.N.W., the shore of which was formed by a fine sandy beach; there is reason to believe that it may be sheltered from the prevalent winds. Some islands, very close to the shore, may also afford anchorage, if bottom could be found near them; but this cannot be asserted, as all the land is very perpendicular, and very high. Nearly all the capes are terminated by a conical rock, on the summit of which is a clump of trees of a very regular figure, and from time to time several rocks like them are seen.

This coast is very broken and verdant, and has a picturesque and pleasant appearance; but it is scarcely inhabited, nor does it seem capable of being so, from the density of the forests, which extend from the summits of the mountains to the shore. But very few villages are therefore to be seen, and these stand in spots that have apparently been cleared.†

Point Philip is in lat. $10^{\circ} 34'$, and is the S.E. point of a bay 4 or 5 leagues in

* Voyage de D'Entrecasteaux, tome i. 390.

† D'Entrecasteaux's ship was drifted 5 or 6 leagues to the E.S.E. during the night when off this part of the coast, May, 1793.

extent and 2 leagues in depth. The N.W. point of it, *Point Achard*, is still more steep than any of the land seen to the southward. The sea broke violently against it; and to the East of it is a sandy beach, on which the breakers formed a heavy bar. On this beach large numbers of natives were collected; and on doubling the cape there were seen, on its western part, great numbers of houses, not only near the beach, but also on the summit of the mountain. The coast still was pleasant in appearance, from its verdure. Off *Point Achard* some shoal water extends for one or two cables' length. From this point the coast trends directly to the North to *Cape Recherche*.*

LEOUÉ BAY.—The ensuing recent account is given by M. Dutailis, of the French ship *L'Ariane* :—

The anchorage occupied by the *Ariane*, in the Bay of *Leoué*, was in lat. $10^{\circ} 3' 40''$ S., lon. $161^{\circ} 31' 4''$ E.† The variation was $10^{\circ} 20'$ E.

The strait which forms its entrance is open from the West to S.W., and forms a gullet, the narrowest part of which serves as a passage to the anchorages North and South of this position. Fifty vessels of any magnitude may readily find anchorage and shelter from wind and sea, and make any reparations here.

In the North part, named *Makira*, where the missionary establishment was, there are several water-courses, of most excellent quality, and the shore is so steep that the boats can lie against it, and take in the water with an ordinary hose. There are several rivers which enter the sea around the bay. In front of *Makira* is the village of *Jone*.

Some houses, called *Maraugoa*, exist also in the South part, on the sides of a bay which is very convenient for heaving down ships. It lies to the West of an island called *Asouni*, at $1\frac{1}{2}$ miles from the village of *Jone*.

The summits of the hills, at the height of 800 feet, seem to be very favourable for every species of cultivation. M. de Reraceson found here, at the time of his expedition, plantations of taro, cocoa-nut trees, and bananas. This part, covered with numerous villages, and a very active population, seemed to be in every respect convenient for establishments, inasmuch as the lower country, entirely covered with trees, and with a constant humidity, would be, without doubt, prejudicial to the health of Europeans.

The temperature in the bay, although so closed at the anchorage that the entrance to it cannot be made out, kept at the height of 23° to 24° (R.) during the fifteen days that the *Ariane* remained here. The sun was then at its zenith, and going to the North. The barometer remained constant at 0.756 m.

The bay is rich in fish of every species, and all kinds of fruit are abundant. The hogs and cattle left by the missionaries, if they have not been destroyed by the natives, will soon form a source of supply which must continually tend to increase, and make this part one of the best and most certain ports for refreshment in the western Oceania.

The Bay of *Sante Marie* is very difficult to make out from the offing, because it is so confounded with the high lands surrounding it on all sides.

* Voyage de D'Entrecasteaux, par Rossell, pp. 383—386.

† This position does not agree with the latitude on the chart.

In coming from the West, you must keep *Point Achard* (forming the N.W. extremity of the gulf) on the bearing of N. 60° W., *true*; and, in coming from the East, rounding *Capes Philip* and *D'Entrecasteaux*, as well as the island outside of it, bring also Cape Philip to bear S. 10° E., *true*. The junction of these two bearings will be at the western extremity of the bay. From thence to the passage it is not more than 1½ miles, and 2 miles to the anchorage. When once within the gullet, you may anchor on either side, so that it is very near the land.*

MALAYTA ISLAND † is to the northward of San Christoval, and, according to D'Urville's observations, is 70 miles in length, N.W. by N. and S.E. by E. *Cape Zelée*, its southernmost point, is in lat. 9° 45' 0" S., lon. 161° 39' 24" E. This island is surrounded in the interior by high summits covered with wood; the shores are low, and covered with mangroves, the feet of which are often washed by the waves. The shores seemed to be but thinly inhabited, and a few canoes vainly endeavoured to reach D'Urville's ships. They sailed from the southward along its western side throughout the day, without remarking any breaks in it, except some small indentations on the beach, indicating the mouths of some rivers or unimportant necks.

The interior presented several ranges of hills, which showed that the island was of a considerable breadth. The shore seemed to be nearly uninhabited, neither cocoa-nuts nor natives being visible; a few huts, at distant intervals, showed that it was not quite without people. *Cape Kolowrat*, the highest summit, 4,274 feet, is in lat. 9° 6' 30" S., lon. 161° 2' 24" E.

On reaching the parallel of 9° S., the coast begins to trend more to the North, and also appears to be much more habitable; fine clumps of cocoa-nut trees and here and there pleasant villages come into view.

Béjean Reef lies off this part of the coast, 5 miles distant, lat. 8° 50' S. It is level with the water's edge, and most dangerous. It is not more than a cable's length broad, and extends parallel with the shore.

Cape Ritters is in lat. 8° 41' S., lon. 160° 40'. Here the appearance of the land entirely changes. To the East of it is a channel, rather narrow, in which there is most likely good anchorage. It extends far to the E.S.E.

The land here becomes steep at the shore, and then rises gradually to the summits, which are moderately high. The land is entirely covered with wood. Here and there are spaces, which seem to have been cleared, in the midst of which are a few huts, but no natives were seen.

CARTERET ISLAND may be the northern portion of what D'Urville considers Malayta; the channel above mentioned may insulate it.‡

Cape Astrolabe is the northernmost point of this range of land, the two extremes

* M. Dutaillis, *Annales Hydrographique*, tome i. pp. 158, 160.

† Malayta, or Malaïta, was a name imposed on this island by Ortega, sent thither by Mendaña, and is evidently the *Terre des Arsacides* of Surville; but his later appellation must give way to that of its discoverer.

‡ The details of each voyager's observations here are so imperfect and discordant, that nothing very certain can be gathered; hence the speculations formerly given cannot carry great weight now that a more perfect acquaintance with the actual form of the islands is attainable. See Krusenstern, vol. i. pp. 164-5.

of which are thus named after D'Urville's ships. The cape is in lat. $8^{\circ} 21' 30''$, lon. $160^{\circ} 37' 24''$ E. Of the N.E. side of Malayta we have no accounts worthy the attention of the navigator.

GUADALCANAR ISLAND is parallel to, and to the southward of, Malayta. It is separated from it by Indispensable Strait.

D'Entrecasteaux says that the easternmost cape of Guadalcanar is of moderate height, but the land to the West of it is very high. Near the cape is an island, in lat. $9^{\circ} 49' 15''$, lon. $160^{\circ} 55' 54''$, covered with trees, only separated from it by a very narrow channel; and several islets, equally well wooded, some of which are connected by breakers. The *Recherche* ran to the West along the land at $2\frac{1}{2}$ miles off. The coast is not so steep-to as that of the South side of San Christoval; at some distance off the land a change in the colour of the sea shows that there is but little water, and the frigate passed a shoal, the swell on which was felt, but passed too quickly to sound on it. The coast could not be well seen through the fog which enveloped it, but the shoals off it were very evident.

Cape Henslow was named by Lieutenant Shortland, in the *Alexander*, in 1788, and is the southernmost point of Guadalcanar; it is placed by him in lat. $10^{\circ} 2'$, lon. $161^{\circ} 12'$: but by D'Entrecasteaux it is in lat. $9^{\circ} 59'$, lon. $160^{\circ} 39'$.

The whole of the South coast of Guadalcanar is mountainous, and is so high that its summits are almost constantly enveloped in mists, so that the climate must be very wet. *Mount Lammas* was thus indistinctly seen and named by Lieutenant Shortland. During the three days (June 1st to 3rd, 1793) that the *Recherche* was here, they scarcely ever saw the tops of the mountains.

Cape Hunter is in lat. $9^{\circ} 49' 30''$ S., and lon. $159^{\circ} 57'$ E. The coast here is covered with trees from the shore to the summit of the mountains; some small rocks terminate the most projecting headlands. There must be soundings off the beach which runs along it; at least the difference in the colour of the water indicates as much.

At about 8 leagues to the N.W. of Cape Hunter, and at a point where the coast forms an elbow, and thence trends to the North, there is a small island very near the land, which is not more than 100 fathoms in circuit, and which seems to be connected by reefs to the shore. The great quantity of trees with which it is covered, and the great variety of them, render this island very remarkable. There were seen a very great number of cocoa-nut trees, bananas, and others unknown. Several natives were sitting on the shore. It is in lat. $9^{\circ} 31' 33''$, lon. $159^{\circ} 41' 39''$. To the West of this small island is a large reef, lying nearly a league off the land.

To the North of this is a dangerous shoal, on which the *Recherche* nearly struck, and had soundings in 7 fathoms; but bearing to the West they avoided the danger, and had bottom with 45 fathoms, find sand and coral, within two cables' length of its edge. This shoal prevented them approaching the N.W. extremity of Guadalcanar, which, however, was seen perfectly. It was named *Cape de l'Espérance*, and is in lat. $9^{\circ} 16' 30''$, lon. $161^{\circ} 46' 8''$.*

The N.E. coast of this extensive island is still almost entirely unknown. On its North side, and near to a river, called by Mendaña *Galego*, is the *Port de la Cruz*; and 2 leagues beyond it, to the S.E., is a second river, named by him the *Ortega*.

Between the northern ends of Guadalcanar and Malayta there is a chain of islands, discovered by Ortega, and which have been the subject of much discussion. They are called by him *Sesarga*, *Florida*, *Buena Vista*, and *Galera*. Some charts have exhibited the islands of Malayta separated into distinct portions bearing these names. They were seen, but imperfectly, by D'Urville, November 17, 1838. He approached within 3 or 4 miles of their North extremity; they seemed to him to be high, and moderately wooded; here and there were seen some fine meadows, but neither canoes, huts, nor natives, were visible.

Buena Vista, one of the northernmost, 1,000 feet high, is in lat. $8^{\circ}55'30''$ S., lon. $160^{\circ}5'24''$.

Between this and Cape Prieto, the S.E. extreme of Ysabel Island, is an isolated rock. It is 18 or 20 feet high, black and perpendicular, and its summit is surmounted by two trees. Probably it is surrounded by a bank, with 25 to 28 fathoms, but it might be only a rock. It is in lat. $8^{\circ}45'0''$, lon. $159^{\circ}57'$.

INDISPENSABLE STRAIT, separating Malayta and Guadalcanar, is the bay supposed to be seen by Ortega to the eastward of the South point of Ysabel Island. It derives its name from the ship which first sailed through it under Capt. Wilkinson, in 1790.

A dangerous reef lies between Malayta and Guadalcanar, supposed to be in lat. 9° S. It is said by the whalers to lie nearly in the middle of Indispensable Strait, and that the brig *Melrose* was wrecked on it.*

YSABEL ISLAND lies to the North of Guadalcanar. It is 120 miles long, and, perhaps, 25 miles in its maximum breadth.

Cape Prieto (Black Cape) is its S.E. extremity. According to D'Urville, it is in lat. $8^{\circ}34'$ S., lon. $159^{\circ}53'54''$, and was thus named by Ortega. Four miles to the N.W. of it is Mount Gaillard, which is 2050 feet high.

ST. GEORGE'S ISLAND lies to the West of the South end of Ysabel, and forms with it the *Baie des Mille Vaisseaux* (Thousand Ships Bay), discovered by Ortega. The island is about 13 miles in length, and seems entirely uninhabited.

Pigeon or Passage Island lies nearly in the centre of the mouth of the bay, and has a reef off its South side. This island was daily frequented by the sportsmen from D'Urville's ship, and they procured an ample supply of the bird whose name was applied to it. It is a small spot, embellished with a few trees, and is the real dove-cot of the neighbourhood, large flocks of them leaving here for the larger islands, and returning in the evening.

Astrolabe Harbour is directly to the West of this. It is not more than a mile in its greatest extent, but the water is so quiet, that, if necessary, a ship could heave down and careen with the greatest security. The coast is guarded by a continuous belt of reefs awash, which extend only a few yards off. The position of the *Astrolabe*, which anchored here in November, 1838, was not more than

* Nautical Magazine, November, 1848, p. 575.

50 yards from the trees on shore to which she was moored, the stern of the vessel lying secured by an anchor fixed on the other side of the channel. It seemed that this cove perfectly answers the purpose, as whatever may be the intentions of the natives who may come to visit the ship, all works can be carried on within reach of the ship's guns. The drawbacks are that few fresh provisions can be obtained, and, besides this, water is difficult to be procured, as only a few small streams, quite insufficient for the purpose, could be found; it was thought that it was rarely visited by the whalers, though that they had been was evident, from these causes. Fish is also difficult to be caught, though abundance were seen. The station in Astrolabe Harbour is in lat. $8^{\circ} 31' 0''$ N., lon. $159^{\circ} 41' 0''$.

St. George's Island is separated in the North from Ysabel by the *Ortega Channel*. It is scarcely 300 yards broad. Its depth varies between $3\frac{1}{2}$ and $4\frac{1}{2}$ fathoms. The shores are clear, and excellent anchorage is found throughout it; the shores are lined with mangroves, which extend a quarter of a mile into the sea, and render them uninhabitable. Towards its seaward entrance, the Ortega Channel terminates in a large bay formed by two islands.*

The S.W. coast of Ysabel Island was not closely examined by D'Urville. He passed at 7 or 8 miles distant. The shores presented nothing remarkable. They were surmounted by a chain of mountains, the summits of which were frequently very lofty. No cultivation was observed on any part, and they had a most wild appearance. The details of the coast, and whether there were any inhabitants on it, could not be seen; it seemed to be low, very much covered with wood, and lined with an impenetrable barrier of mangroves. Some very narrow openings showed evidences of a great number of islands, or else the mouths of rivers, in some parts.†

Towards the N.W. part of the coast is *Cape Foxhull*, and then *Nairn Island*, lat. $7^{\circ} 40' S.$, lon. $158^{\circ} 23' E.$: beyond the latter is an extensive range of low islands, which occupy the greater portion of the space between the islands Ysabel and Choiseul. These islands exhibited no signs of inhabitants; neither cocoa-nut trees nor canoes were seen.

Cape Comfort (according to D'Urville, in lat. $7^{\circ} 23' 40''$, lon. $158^{\circ} 11' 24'' E.$) is the northern point of Ysabel Island, and received its name from Hammond. Surville anchored in a harbour, which he named *Port Praslin*, on the N.W. end of the island; and here he had several conflicts with the natives, which caused him to quit it. Farther to the S.E. we may look, according to Fleurieu, for the bay in which Mendafia's ship anchored, and which he named the *Port of Santa Ysabel de la Estrella* on the first discovery of the islands.

MANNING STRAIT, the passage separating Ysabel and Choiseul Islands, was traversed by Manning in 1792, and was also by D'Urville in 1838; the latter states that the tide-races in it were so strong as to resemble the sound of breakers close-to.

Capt. Manning recommends strangers to send a boat ahead, in order to examine it in passing through. He says:—"We could not get ground with

* D'Urville, tome v. p. 28.

† Voyage de *L'Astrolabe*, tome v. p. 88, et seq.

18 fathoms all through the channel. The tide ebbs and flows regularly, and I would recommend going against the tide, as that will set you to the eastward, clear of the reef. The least water we found on the reef was a quarter less 4, and that very near the islands. The other parts were very irregular in soundings, from 4 to 13 fathoms, and *all coral rocks*. The water being very clear, when we anchored, we could see the bottom very distinctly in 8 and 9 fathoms.”*

GEORGIA ISLAND.—The land to which this name is given by Admiral Krusenstern is of doubtful character; whether it be continuous land or a range of islands we have only some detached observations of D’Entrecasteaux and of Lieutenant Shortland which will lead to any conclusion. The imperfect relation of the voyage of the latter, in the account of Governor Philip’s voyage, will not help much. The chart will show the amount of what is really known, and we therefore quote the words of Admiral Krusenstern, who has considered the whole subject.

“According to Shortland, the *Capes Allen, Middleton, and Satisfaction* belong to the same land (or to Choiseul Island), but I think he is mistaken; they are probably nothing more than islands. The rock, which he calls the *Eddystone* (1,036 feet high), according to the observations of D’Entrecasteaux, is in lat. $8^{\circ} 18' S.$, and lon. $156^{\circ} 30' 40'' E.$; it is not 2 leagues S.S.W. of Cape Satisfaction, but a mile to the West of that cape.†

“It has a small harbour on its N.W. side. A vessel can moor in the cove at the head of the harbour, where she will be completely land-locked and sheltered from all winds. The Eddystone is of small extent, and elevated 1,036 feet at the West side. The brig *Naiad* lay here for six weeks in 1844, and her commander made a plan of it. The natives are not to be trusted. They are negroes, with woolly hair, and are cannibals.‡ Capt. Bristow says it was thickly inhabited; he could not land in consequence, but procured some cocoa-nuts.§

“At first sight Shortland thought that the cape, which he saw in lat. $8^{\circ} 42' S.$, lon. $157^{\circ} 30' E.$, was the extremity of an island, along which he had passed; but afterwards he thought that he had mistaken; this caused him to name it *Cape Deception*: a group of islands near it was named *Hammond Isles*. If these islands and Cape Deception be compared with the bearings given by D’Entrecasteaux, it would seem that Cape Deception formed part of one of these latter islands, and that it formed the western extremity of the southernmost. D’Entrecasteaux places it in lat. $8^{\circ} 41' S.$, lon. $157^{\circ} 19' 30''$, or 11 miles East of Shortland.

“Capes Satisfaction and Deception form the southern entrance to Manning Strait, which Shortland took for a bay, and named *Indian Bay*. I have given the name of *Simboo* to an island which lies to the North of Cape Satisfaction, because the natives, who came out of the bay to Shortland’s ship, called the land near Cape Satisfaction by that name. We know nothing of the space between

* Purdy’s Tables, pp. 103-4.

† A SHOAL, with not less than 5 fathoms water on the shoalest part, lies 3 miles S.S.W. from the Eddystone Island, New Georgia. It was discovered in 1843.—*Nautical Magazine*, November, 1848, p. 575.

‡ *Nautical Magazine*, 1849, p. 27.

§ Purdy’s Tables, p. 103.

these islands and Manning Strait, nor yet of the South part of Choiseul Island. The S.E. point of this island is in lat. $7^{\circ} 33'$, lon. $157^{\circ} 43'$. I have called it *Cape Fleurieu*.

"Shortland called a point to the East of the Hammond Isles *Point Pleasant*. D'Entrecasteaux places it in lat. $8^{\circ} 45'$, and lon. $157^{\circ} 35' 30''$. We do not know whether the coast from Cape Pleasant to that named *Cape Pitt* (lat. $8^{\circ} 53' S.$, lon. $158^{\circ} 14' 30''$) by Shortland forms a series of islands, or if it be the continuation of a single island, as I suppose. Under this supposition I have united these two capes, and given the name of GEORGIA to the island, as all Shortland's discoveries in this part were included under that name. The length of Georgia Island, in an East and West direction, is 15 leagues, but we know nothing of its extent North and South. On the South of it is the inlet named by Shortland *Hummock Bay*; according to D'Entrecasteaux's chart it is encumbered with islets and rocks. *Cape Nepean* also belongs to this island; according to D'Entrecasteaux, it is in lat. $8^{\circ} 51' 30''$, lon. $157^{\circ} 48' 45''$, or $21'$ West of Shortland's position.

"On Arrowsmith's chart a reef is marked, called the *Bridgewater Shoal*. The longitude of this I make to be $157^{\circ} 12'$; and 12 leagues S.W. by W. of it is an island called *Princessa*; this I place in lon. $157^{\circ} 6'$. To judge from their position they ought to have been seen by D'Entrecasteaux; but it may be supposed that they were not placed on the chart without good authority."*

CHOISEUL ISLAND was thus named by Bougainville, and it was also passed by Shortland in 1788.

Its eastern point was called *Ile de Première Vue* by Surville, who saw it in the *St. Jean Baptiste*, in 1769. It is only an elevated summit, which stands on the East point, and being connected by low land, at a distance appears like an island. D'Urville places it in lat. $7^{\circ} 20' 10''$, and lon. $157^{\circ} 34' 10'' E.$

A little to the North of this D'Urville passed, as is supposed, over a bank of $5\frac{1}{2}$ to 7 fathoms, but this requires verification.

The western extremity of the island has been called *Cape Labé* (lat. $7^{\circ} 29' 5'' S.$, lon. $157^{\circ} 55' 20''$) by Admiral Krusenstern, after one of the officers on board Surville's ship, and to the N.W. of it is a high mountain called by Surville the *Gros Morne*; he took it for an island, but Krusenstern supposes it to form the N.E. extremity of the Choiseul Island.

The N.E. sides of Choiseul Island are very high, mountainous, and steep; the coast falls with rapid descent to the sea. Some indications of inhabitants were seen, but evidently very few. Towards the North, and near to Cape Alexander, the North point, the low land seems to extend to a greater distance, forming plains of considerable extent. *Cape Alexander*, lat. $6^{\circ} 42' 20''$, lon. $156^{\circ} 32' 34''$, is formed by very low land, apparently quite capable of cultivation. A cape to the eastward of Cape Alexander was named by Capt. Hogan, in 1796, after his ship, *Cape Cornwallis*, which he took for the former cape, but his positions do not agree.

Of the S.W. side of the island our knowledge is very imperfect, as no recent

* Mem. Hydrog., tome i. pp. 162—164.

navigator has given any account of it. Near the N.W. extremity, a portion that Bougainville examined more closely, he places a bank parallel with the coast, on which are 5 and 6 fathoms, coral bottom, which, turning at an angle in its southern part, extended across, for a large portion of the breadth, the Strait of Bougainville. This he calls the *Raz Denis*, after his master; but it is stated by Bougainville* that this does not exist as a bank, being only overfalls from the very strong current running from N.W. to S.E., breaking as if over rocks awash.

Warrior's River (*Rivière Guerriers*) was examined by Bougainville's boats, but the coast is nearly unapproachable, the sea beating full on it, and the mountains coming down nearly to the coast. The land is almost entirely covered with wood: but few huts or people were seen.

Choiseul Bay lies to the North of this, but Bougainville did not enter with his ships, on account of the hostile character of the people, who came in about ten canoes out of the above river to attack his boats. The peninsula which forms the North side of the bay is (or was) entirely covered with cocoa-nut trees.

BOUGAINVILLE STRAIT, thus named from the navigator who first passed through it in 1768, separates Choiseul Island from Bougainville Island, the next to the northward. Lieutenant Shortland sailed through it twenty years later, and gave the name of *Treasury Islands* to the numerous islands which lie in the strait. There is one which is tolerably large, the East extremity of which he named *Point Danger*, because it was surrounded with rocks; the S.E. point is named *Cape Stephens*. Krusenstern has called the large island to the North of this *Shortland Island*; to the North of this is a large number of islands, which occupy all the space between it and *Cape Friendship*.

A commander states, that in February, 1843, he came through Bougainville Straits from the northward in the night; and at daylight in the morning, when about midway between Cape Alexander and Choiseul Bay, off shore 5 miles, he saw rocks under the bottom, and had a cast of the lead in 9 fathoms: he then hauled to the westward, and immediately got out of soundings. From the threatening appearance of the weather, he did not stand in again, but the idea formed at the time was, that the whole line of coast, from Cape Alexander to the North side of Choiseul Bay, was fronted with dangerous shoals and coral patches, and that a vessel bound through Bougainville's Straits should not approach nearer to that coast than 5 miles until it is better examined. A master of a whaler informed him that once coming through these straits in the night he saw the bottom in one place, and had a cast of the lead in 7 fathoms.—(*Nautical Magazine*, 1848, p. 575.) All this confirms the descriptions of Bougainville, as given above, and will caution the navigator in passing through it.

BOUGAINVILLE ISLAND is the next to the northward. Its South part is mountainous, and some of its summits are very high, their form and disposition indicating that the island is here of considerable breadth. The coast appears to be very much varied, and covered with a thick forest; it is backed to the northward by a chain of immense mountains. The highest of these summits, says D'Urville, appeared, from the reflection of the sun, as if collections of snow

* Voyage, &c., p. 266.

existed in the ravines (December, 1838). The numerous smokes seen on the island were an evidence that it was much thicker peopled than the islands to the S.E. The sea abounded with fish in great variety, among which was an enormous ray, 8 or 10 feet broad.

Toward the N.W. Bougainville Island is bordered by a long extent of low land, in the middle of which several islets are seen. Numerous clumps of cocoa-nut trees adorn the beach, and even the higher grounds. On the sides of the hills some huts may be seen, and a great number of smokes.

Cape l'Averdi is the North point of Bougainville Island, and was thus named by its discoverer.* D'Urville places it in lat. $5^{\circ} 30' 0''$ N., lon. $155^{\circ} 7' 14''$. It is a long, low, and wooded point, which projects considerably. The appearance of the coast is here much more pleasant, and of greater richness. Fleurieu supposes that the *Cape Cras* of Lieutenant Shortland and this are identical.

From the description given by Capt. Hogan (*Oriental Navigator*, p. 678), the North coast of Bougainville Island is remarkably high and picturesque. *Mount Cornwallis* appeared to be a volcano, emitting a great quantity of sulphurous smoke.

D'Entrecasteaux passed along the western side of this island, and from his observations it is placed in the chart.

BOUKA ISLAND is the last of the Salomon Islands. It is much lower than its neighbour, and appears to be fertile and well peopled. It was called by Carteret *Winchelsea Island*, and also *Anson Island*, but its proper name is *Bouka*.† The strait separating Bougainville Island from Bouka was not well determined, but D'Urville passed near enough to see that it was very narrow, and apparently but little practicable. Bougainville was prevented from landing on its eastern side by the contrary wind and the rapid currents running to the N.W. He says that a fine plain, planted entirely with cocoa-nut and other trees, presented a most agreeable prospect; and he strongly desired to find some anchorage on it, but was prevented as above.

Capt. Bristow sailed along its western side in July, 1812. He says:—"A chain of islands trends along it, connected by coral reefs; and on the inside of which, parting them from the real shore of Bouka, is a space of water that I take to be one continued harbour for several miles in length, and not less than 1 or 2 in breadth, East and West. Several openings in the reef lead me to believe that there would be no difficulty in finding an entrance. Off the N.W. part of Bouka there is a reef trending off to the West for about 2 miles: otherwise I saw no danger exceeding a mile from the shore."‡

The summit of the island is in lat. $5^{\circ} 16' 0''$ S., lon. $154^{\circ} 39'$ E.; and *Cape North* in lat. $5^{\circ} 30'$, lon. $154^{\circ} 40' 10''$ E.

To the north-eastward of the principal range of the Salomon Archipelago is a series of small and detached islands and shoals, some of which are of doubtful existence. The following is an account of them:—

The STEWART ISLANDS are a group of five small coral islands, discovered

* Bougainville's Voyage, &c., p. 270.

† *Ibid.* p. 271.

‡ Purdy's Tables, p. 103.

by Capt. Hunter, on his passage to Batavia, after the loss of the *Sirius*, 1791. They are covered with cocoa-nut trees, connected by coral reefs, and visible from a ship's deck about 12 miles. The easternmost and largest isle (*Hogan's Island*?) is about $1\frac{1}{2}$ miles in length. It is situated in lat. $8^{\circ} 24' 24''$ S., lon. $163^{\circ} 2'$ E. This position (1847) will be found nearly correct, thus verifying Krusenstern's longitude. It is advised that all ships bound to China or Manilla from New South Wales should sight this group, for the purpose of testing their chronometers. No danger need be apprehended from the hostility of the inhabitants, as they are very hospitable, and few in number, there being only thirty-eight able-bodied men in the group.

The whole population, in 1847, amounted to 171 souls. Nearly all the males can speak English. They rear pigs and fowls, which they bring off and sell to ships for tobacco, calico, &c. A hog weighing 100 lbs. can be purchased for 5 lbs. of tobacco, or 10 yards of cheap calico. The natives are recommended as trustworthy.*

INATTENDUE or GOWER'S ISLAND.—The first of these names is due to its discoverer, Surville, in 1761; the second to Carteret, 1767. Capt. Hogan says:—"Gower's Island is about 4 miles in a North and South direction, and 2 miles East and West; it is low and level, covered with trees, and nothing remarkable on or about it, that I could see, further than one tree with a bushy top, which appears a little higher than the rest, in the middle of it." Lat. $7^{\circ} 56'$ S., lon. $160^{\circ} 11'$ E.

RONCADOR REEFS, CANDELARIA BANKS.—In 1781 the pilot Maurelle, whose positions have been open to much discussion, after having passed what he supposed to be the Ontong Java Islands, discovered in the night a shoal all white with foam on the N.E. quarter; from the noise made by the breakers he called it the *Roncador* (snorer), and then stood away. Its position, as calculated by Krusenstern, is lat. $6^{\circ} 17'$, and lon. $159^{\circ} 14'$.

In 1567 Mendaña discovered some reefs which he named *Bazos de Candelaria* (Candlemas Reefs). They extended N.E. to S.W. 15 leagues, and their latitude was found to be $6^{\circ} 16'$. Admiral Krusenstern is of opinion that these shoals are identical with Maurelle's discovery, in opposition to Fleurieu and others; but besides the difficulty of exactly reconciling such desultory observations, our very imperfect knowledge of these parts will not allow any very decisive opinion to be given; still, for the present, they may be considered as the same.

BRADLEY REEFS.—On March 12th, 1791, Capt. Hunter discovered, in lat. $6^{\circ} 52'$ S., lon. $161^{\circ} 6'$ E., a very dangerous reef, which extended 5 leagues in a W.N.W. and E.S.E. direction, and which, although beneath the surface of the water, was so shoal that the breakers could be seen two leagues off. The commander was fortunate enough to clear the danger, although, at the time he first saw it, he was apparently quite surrounded by the breakers.

These have been confounded by some with those last described, but Krusenstern has disproved this.

* Krusenstern, vol. i. p. 182; *Missionary Voyage*, p. 292; *Purdy's Tables*, p. 100; *Nautical Magazine*, November, 1848, p. 575.

ONTONG JAVA ISLANDS; HOWE'S GROUP.—The group first named were discovered by Le Maire and Schouten, June 20th, 1616, and again seen by Tasman, March 22, 1643, who gave this name to them. Le Maire and Schouten describe their discovery as consisting of five or six low and wooded islands, and several reefs; one of these islands extended a considerable distance to the North and N.W. of the largest one. Le Maire says in his journal that the small islands seemed to be connected by low land. Some natives, armed with bows and arrows, gave them to understand that they would see a large land to the West, which they subsequently sailed for. Tasman states that the number of the islands was twenty-two, but he passed to the North of them; and the difference of the tide, and the nature of the islands, may account for the discrepancy.

Howe's Group, or *Lord Howe's Islands*, were discovered by Capt. Hunter, in the *Waakzaamheid*, 14th May, 1791. He states that they consist of thirty-two islands, lying in an East and West direction; he passed to the South of them.

Admiral Krusenstern supposes these to be identical, and places them in lat. $5^{\circ} 30'$, and lon. $159^{\circ} 30'$, or more correctly, between lat. $5^{\circ} 40'$, and lon. $160^{\circ} 20'$.

MORTLOCK ISLES.—A group, to which Admiral Krusenstern applied this name, was discovered by Capt. Mortlock, in the *Young William*, in 1795, in lat. $4^{\circ} 45' S.$, and lon. $157^{\circ} 0' E.$ He called them *Hunter Islands*; but as this name is given to several others in the Pacific, that of this discoverer was preferred. They do not appear to have been since seen, but are evidently a distinct group from the other, described above.

LE MAIRE and TASMAN'S ISLES.—After Tasman had made the island to which he gave the name of Ontong Java, as above described, he saw, to the N.N.W. of them, another group. He gives no account of their number or extent, nor their distance from the former. This discovery was verified in 1824 by Capt. Wellings, who discovered a group of low islands in lat. $4^{\circ} 29' S.$, and lon. $159^{\circ} 28' E.$ This group may be the same as Simpson's Coral Islands, described below.

FRINDSBURY REEF lies between these two groups, in lat. $5^{\circ} 0' S.$, lon. $159^{\circ} 19'$. A whaler of this name was wrecked on it, March, 1832. It is a dangerous coral reef, with heavy surf beating over it.—(Horsburgh.)

Simpson's Coral Islands.—A group of low coral islands, covered with coconut trees, and inhabited; in lat. $4^{\circ} 52' S.$, lon. $160^{\circ} 12' E.$, according to Mr. Thomas Beckford Simpson, of Sydney.*

MARQUEEN ISLAND, COCOS ISLANDS.—On June 22, 1616, Le Maire and Schouten discovered a group of twelve or thirteen islands, lying in a N.W. and S.E. direction, extending a German league and a half, and 32 leagues distant from the Ontong Java Islands. Le Maire speaks but of a single island, but William Schouten says that the whole group, by the closeness of the islands one to another, seemingly form but one. They called them *Marqueen Islands*.

In 1790, Capt. Wilkinson, in the ship *Indispensable*, discovered a group in

* Nautical Magazine, 1848, p. 574.

lat. $4^{\circ} 36'$ S., and lon. $156^{\circ} 30'$ E. He called them *Cocos Islands*, but they probably are identical with the Marqueen Islands.

They must also be the *Massacre Islands* of Morrell, whose crew was cut off by the treacherous natives in May, 1830, on their coming here for biche-de-mar. His anchorage was in lat. $4^{\circ} 50' 30''$, lon. $156^{\circ} 10' 30''$.

NINE ISLANDS.—Capt. Carteret, in 1767, discovered a chain of *nine* flat islets, which extended 15 leagues in a N.W. by W. direction; he considered them to be the Ontong Java of Tasman. The South point of them would be in lat. $4^{\circ} 55'$, and lon. $155^{\circ} 12'$. Lieutenant Shortland, on August 9th and 10th, 1788, saw four islands trending in a N.W. by W. and S.E. by E. direction; but, being at the distance of 5 leagues, he could not see the whole group. His position (corrected) would be lat. $4^{\circ} 50'$ S., lon. $155^{\circ} 11'$ E. Capt. Hunter, on May 18, 1791, saw a group of five small islands, connected by reefs, and two detached rocks; their direction was N.E. and S.W. The southernmost was in lat. $4^{\circ} 53'$ S., lon. $155^{\circ} 20'$ E.

The accordance of these positions leads to the belief that they refer to one and the same group.

GROENE ISLANDS; SIR CHARLES HARDY ISLAND.—Le Maire and Schouten, sailing from the Marqueen Islands, made, on June 22nd, 1616, three flat and wooded islands; two of them appeared to be 2 German leagues in length, but the third was small; they saw, at the same time, a high island to W. by N. The three low islands were named Groene Eylanden, or Green Islands. They only gave their distance from the coast of Peru, but their longitude has been gained approximatively.

Carteret discovered, in 1767, an island which he named *Sir Charles Hardy Island*. He places it in lat. $4^{\circ} 50'$ S., lon. $154^{\circ} 12'$. Maurelle, in 1781, after seeing some islands which he took for Ontong Java, passing to the westward, saw two islands which he called *Caymanes*. Capt. Hunter saw it, May 19, 1791, and placed it in lat. $4^{\circ} 41'$ S., lon. $154^{\circ} 20'$ E. The approximation of these positions leads to the inference that the Groene Islands of Le Maire and Schouten, the Caymanes of Maurelle, and the Sir Charles Hardy of Carteret, are the same land, notwithstanding the discrepancies as to the *number* of the islands. Perhaps the following extract from Capt. Bristow, who cruised here in the *Thames*, in July, 1812, may clear this:—At 2 P.M., saw Sir Charles Hardy's Island to the W.S.W. about 4 leagues. At 3^h, being about 7 miles from the nearest land, with the S.E. part of Sir Charles Hardy's Island bearing S. by W. and the N.W. part S.W. by W. $\frac{1}{2}$ W. (*mag.*), there is a passage open of about half a mile wide, consisting of nothing but breakers between it and another island to the N.W. that terminates in a low point, and a reef running into the sea about a mile. Most probably these islands have been mistaken for one. Laying under the point that terminates the N.W. part of the islands, I was surprised to see another small island in the N.W., not laid down in my chart, and about 4 leagues distant.

In concluding the very imperfect notices of this range of islands, which, taking the same general trend as the Salomon Islands, it may be remarked, may either be more in number or less than here stated, it is probable that all the islands or shoals may occupy the same line of direction, or nearly so. The works of

Krusentern, Burney, and Purdy, will give all the particulars of the discussion. Admiral Krusenstern's opinions have been followed here.

RENNELL'S ISLANDS.—Two islands to the southward of Guadalcanar, the southernmost of the Salomon Islands, apparently discovered by Capt. Wilkinson, in the *Indispensable*, on her voyage from New South Wales to China, in 1790. The ship passed between them. The S.E., or *Rennell's Island* (S.E. extremity), is in lat. $11^{\circ} 38' \text{ S.}$, lon. $160^{\circ} 41' \text{ E.}$ The N.W., or *Bellona Island*, is in lat. $11^{\circ} 11' \text{ S.}$, lon. $159^{\circ} 50' \text{ E.}$

INDISPENSABLE REEF, an extensive reef, lying in a N.N.W. and S.S.E. direction, was discovered by Capt. Wilkinson, at the same period as the last-described group. Its S.E. end is in lat. $12^{\circ} 46' \text{ S.}$, lon. $160^{\circ} 40' \text{ E.}$; and its N.W. end is in lat. $11^{\circ} 44' \text{ S.}$, lon. $159^{\circ} 58' \text{ E.}$

WELLS REEF was discovered by Capt. V. Edwards, in H.M.S. *Pandora*, in 1791. Its East end is in lat. $12^{\circ} 20' \text{ S.}$, lon. $157^{\circ} 58' \text{ E.}$

POCKLINGTON BANK was discovered by a commander of that name, in 1825. According to Capt. Horsburgh, it is 70 miles East of Rossel Island, and is a reef extending in an East and West direction 30 miles. Its centre is in lat. $10^{\circ} 53' \text{ S.}$, lon. $155^{\circ} 30' \text{ E.}$

LAUGHLAN ISLANDS, a group of *nine* islets, extending 5 miles East and West, and nearly as much North and South, including the surrounding reefs, were discovered by Capt. Laughlan, in the *Mary*, in 1812. Two of the largest of them are at most about half a league in extent; the land is only elevated a few feet above the water level.* According to D'Urville, who saw them in 1827, the eastern point is in lat. $9^{\circ} 19' 3'' \text{ S.}$, lon. $153^{\circ} 48' 40''$, nearly identical with that of their discoverer.

CANNAC ISLAND, discovered by D'Urville, lies 9 miles West of Laughlan Islands. It is a rock of 200 or 250 feet in height.† It is in lat. $9^{\circ} 19' \text{ S.}$, lon. $153^{\circ} 30'.$

WOODLARK ISLAND.—The discovery of this island is attributed by Capt. R. L. Hunter to Capt. Grimes, of the *Woodlark*, of Sydney, prior to September, 1836. Capt. Hunter gave the first intelligence to the world of its existence; he saw it in the ship *Marshall Bennett*, September 27, 1836. He says it is probably narrow, in a North and South direction, with small islets lying off the South side. The North side is bold to approach, and clear of danger, extending about 40 miles E. by S. and W. by N. It is of moderate height, with some hills in the interior, the highest being of a remarkable sugar-loaf shape. There are one or two bays on this side, and on the western side of the deepest one was an entrance of a small inlet or river; but it was not examined. This is the sum of the information given by Capt. Hunter, who places its eastern end in lat. $9^{\circ} 9' \text{ S.}$, lon. $153^{\circ} 5' \text{ E.}$; and the western end in lat. $8^{\circ} 53' \text{ S.}$, lon. $152^{\circ} 24' \text{ E.}$, which is not much in error.‡

* Horsburgh, vol. ii. p. 688.

† Voyage de D'Urville, tome iv. p. 489.

‡ Nautical Magazine, July, 1840, p. 465.

The following recent information was given (May, 1848) to M. Dutailis by Lieutenant-Commander Marceau, of the French ship *Arche d'Alliance* :—

The whole of its southern part is bestrewed with small islands, connected with each other for the most part by coral reefs, between which there exist several passages. Up to the present time we only know of those examined by Capt. Rabalau, of the brig *Anonyme*, belonging to the Société Catholique, and which brought and landed Monseigneur D'Antiphelles at *Garupe*, the South port.

The banks are very steep-to. The two passes to the East and West of the islet *Elaue* are very good; the currents are pretty strong in them, and throughout the road sand is found, with ordinary holding ground.

The natives are Papuas, and traded freely alongside, but were well armed with bows, arrows, and spears. There can be no danger in only allowing them alongside; but ships should be constantly on their guard against treachery, and on no account should landing be made without an especial object, and then well armed. The natives might not be inclined to be treacherous, but a savage should never be trusted. Probably the labours of the French missionaries may remove the necessity for these remarks.

MARSHALL BENNETT ISLANDS, three small and high islands to the E.S.E. of Gouveney Island, 10 miles distant, were announced by Capt. R. L. Hunter, of the ship whose name is here given. The positions are :—The easternmost, lat. $8^{\circ} 50' S.$, lon. $152^{\circ} E.$; middle, lat. $8^{\circ} 49' S.$, lon. $151^{\circ} 56' E.$; and the westernmost, lat. $8^{\circ} 46' S.$, lon. $151^{\circ} 52' E.$ *

EVANS ISLAND, seen in 1841, is surrounded with islets and reefs, in the middle of which, a whaling captain assured M. Dutailis that there was a good anchorage. Its position is in lat. $9^{\circ} 10' S.$, lon. $151^{\circ} 55' E.$ †

LOUISIADE ARCHIPELAGO.

This range of islands and reefs were most probably discovered by Torres, in 1606, though the credit of this has generally been attributed to Bougainville. After the separation of Quiros and Torres, the latter determined to go to Manila, and discovered some land in lat. $11\frac{1}{2}^{\circ}$, supposing it to be a portion of New Guinea. He was not able to double its eastern cape (which must be that subsequently named Cape Deliverance by Bougainville), and then bore away along the South side, running 100 leagues, till he came to a strait separating New Guinea and Terra Australis.

Of the northern side of this archipelago, our only authority is the operations of the *Recherche* and *Espérance*, under the orders of Contre-Amiral D'Entrecasteaux, June, 1793, an examination concluded just previously to the death of that navigator, July 20, 1793. Of the South coast we have now a better knowledge. It was, as before stated, examined, but very cursorily, by Bougainville. More recently, however, it has been surveyed by D'Urville, in the *Astrolabe*, in 1840, and still more exactly by Capt. Stokes, in the *Rattlesnake* and *Bramble*. The account of this portion will be reserved for a future section.

* Nautical Magazine, July, 1840, p. 466.

† M. Dutailis, Ann. Hyd., tome 1. p. 160.

"The Louisiade," says M. Labillardière, who accompanied D'Entrecasteaux's expedition, "appears to be well peopled; the inhabitants are quite naked, and are of a light black colour; they wear tufts of feathers around their woolly hair. Some are as black as the natives of Mozambique, whom they much resemble: like them, their upper lip projects a good deal over the under; and these two distinct races, in the same country, present a singularity the more remarkable, as it is also found in the islands of Santa Cruz, and many others in the Pacific. The inhabitants of Louisiade do not understand the Malay language; they construct their cottages like those of Papua or New Guinea, which are raised 8 to 12 feet above the ground. They are armed with darts, and a buckler on the left arm—a weapon not very common among the savages of Australasia. They make nets for fishing; are very fond of odours, and perfume most of the objects of which they make use."*

ADÈLE ISLAND is the easternmost extreme of the Louisiade Archipelago, and is one of the most important points as to its position. It was discovered by Capt. Ruault-Coutance, of the French ship *Adèle*. This small island was seen, and its situation determined, by D'Urville, lat. $11^{\circ} 25'$, lon. $154^{\circ} 34'$. It is a coral bank of 500 or 600 yards in diameter, surmounted by a tuft of trees, and surrounded by a reef, which joins on to Rossel Island, a distance of 7 miles, in a N.W. by W. direction. It must be the *Island of Satisfaction* of Capt. Bristow and the charts.

ROSSEL ISLAND is the eastern large island of the Louisiade. Its position is well determined.

CAPE DELIVERANCE was thus named by Bougainville, and is the easternmost cape of Rossel Island. It is in lat. $11^{\circ} 23' 25''$ S., lon. $154^{\circ} 16'$ E. As before stated, the North side, to which our present description is confined, was examined by D'Entrecasteaux. The following is extracted from his work:—

"The highest portion of this, the easternmost of the Louisiade, was hidden in the clouds; but near the coast it was clothed with thick forests, separated by openings covered with agreeable verdure. A small island appeared, South of which the coast formed a fine bay, where, it may be presumed, was good anchorage."

A chain of reefs extends from the West point of this island for 14 leagues, to within 10 miles of a low island covered with cocoa-nut trees. It was called *Piron Island*. Its shores were bordered with reefs, which extended in an E.S.E. and W.N.W. direction. Over this island some very high land (*Iles du Sud Est*) was seen. Several small and detached islands were also seen. The whole of the islands here, and to the westward, are apparently connected and surrounded by reefs and rocks; some appear above the water, so that the navigation is dangerous if too near. The violence of the current does not diminish this danger.

The *Renard* or *Fox Islands* (West point) are in lat. $10^{\circ} 52' 40''$, and lon. $152^{\circ} 47' 12''$. The bank extends from their western point. D'Entrecasteaux passed to the West of them, and mentions the appearance of a shoal, but which was occasioned by overfalls. Several islands were seen to the North of the Fox Islands, connected by reefs. No houses were visible on these islands, and they

* Voyage in Search of La Pérouse, vol. ii.

would have been supposed to have been uninhabited had not some smoke been seen to rise from the North side of the largest of them.

ST. AIGNAN ISLAND is about 27 miles in length, and is next in order to the N.W. of Renard Islands. Capt. Bristow calls it *Eruption Island*. It is surrounded by very steep rocks, behind which rise, nearly perpendicularly, very high mountains covered with wood. In the spaces between the more dense parts of the forest several houses were visible, near which were the first inhabitants seen by D'Entrecasteaux on this archipelago. Capt. Abraham Bristow passed here in August, 1808. He procured a quantity of cocoa-nuts. The next day, wishing to procure more supplies, the natives, in great numbers, opposed his proceedings. They showed the utmost indifference to barter. They have amongst them a great quantity of cocoa-nuts, some plantains and yams. They have also hogs and dogs; but are very unwilling to part with them. The island is very steep-to, so that a vessel could not anchor.*

Cape Henry is the eastern point of the island, and is in lat. $10^{\circ} 41' 15''$, lon. $152^{\circ} 55' 54''$.

De Boyne Islands lie to the West of St. Aignan Island; their North point is in lat. $10^{\circ} 39' 5''$, lon. $152^{\circ} 22' 20''$.

The portion of the Louisiade which has been described rests upon the single authority of D'Entrecasteaux; but he remarks that there may be many other islands and reefs which escaped his notice, from the fact of the atmosphere being so thick and hazy; otherwise he considered that the positions that were given might be depended on. The currents in the neighbourhood render the navigation the more dangerous, because the various islands composing it are surrounded or connected by reefs, close to which no soundings can be had.

The *Bonvouloir Isles* lie 30 miles N.W. of the De Boyne; some inhabitants were seen on one of them; they were timid and distrustful; they were unarmed, but threw some yams, bananas, and sweet potatoes on board the *Espérance*. They were of the negro race. The *La Seinie Islands* were seen to the westward. Their easternmost is in lat. $10^{\circ} 27' 20''$, lon. $151^{\circ} 20' 24''$.

D'ENTRECASTEAUX ISLANDS, a range of land, the character of which is very undetermined. Whether it really forms a series of detached lands, or an integral portion of New Guinea (which perhaps is more probable), is as yet undetermined. D'Entrecasteaux only saw the N.E. side, nor did he trace its extent southward or westward.

CAPE PIERSON was the most projecting part of this land. It is placed on M. Vincendon-Dumoulin's chart in lat. $9^{\circ} 57' 40''$, lon. $151^{\circ} 13' 25''$. The coast here is formed by high mountains, covered with trees, which rise rapidly from the shore, on which some cocoa-nut trees appear here and there. Beyond, or to the West of Cape Pierson, the land trends to the South, forming an extensive bay; the appearance of the land around it is extremely agreeable, being one of the most pleasant countries they had seen. The mountains were intersected in a less uniform manner than those to the East of Cape Pierson. Cocoa-nut trees were seen, even on the highest parts, an evidence of fertility and the capability

* Purdy's Tables, p. 104.

of maintaining a numerous population. Several villages were visible. The natives came off in their canoes apparently unarmed, but discharged a shower of stones at the boats of the *Esperance*, which was stopped by discharging a musket. They gave undoubted evidence of their being cannibals. The coast was found to be very steep-to, and no anchorage. The western shore of the bay extended to N.N.E., terminating in low land.

To the North of this are *Goulvain Island* and *Well Island*. These apparently lie in front of a vast bay, beyond which, in the distance, were very high mountains. Well Island, East point, is in lat. $9^{\circ} 41'$, lon. $150^{\circ} 58'$. This island is low, and lies off the entrance, the two capes forming the passage being still lower; this circumstance led to the belief that the passage might be very narrow, or barred by a reef, and consequently being open to eastward, would be very difficult to beat out of; it was, therefore, not entered. Off Well Island, to the S.E., breakers extend a considerable distance. In sailing to the northward, the two ships encountered some extensive banks, on the first of which was sufficient water to allow them to cross; but on proceeding farther, and meeting with others, they retraced their route, and left them to the East. To the N.E. of Well Island, 17 miles distant, is a small islet.

Cape Labillardière, lat. $9^{\circ} 26'$, lon. $150^{\circ} 43'$, forms the North part of one of the principal portions of the land or islands; behind it is some very high land, visible at a very great distance, as Bougainville noticed it off the South coast at 80 miles distant, and D'Entrecasteaux saw it as far off from the northward. Off this cape is *Légrand Island*, to the West of Laignel Island. To the East of this again is a range of small and very low islands, connected by reefs and sand-banks. Their general direction is nearly North and South. The smallest of these islands was remarkable for a single cocoa-nut tree, which seemed to grow out of the water; on some of the others, which were larger, some small clumps of this tree were growing.

The TROBRIAND ISLANDS are to the North of this. *Lagrandière Island*, the south-easternmost (S.E. point), is in lat. $8^{\circ} 52' 30''$, lon. $151^{\circ} 9' 44''$ (D'Urville). They are low, and of considerable extent. *Jurien Island* is somewhat higher than the others; to the E. by S. of it is *Jouveney Island*. D'Entrecasteaux passed between them.

Cape Denis is in lat. $8^{\circ} 24'$, lon. $151^{\circ} 1' 24''$. It is the N.E. point of the Trobriand Islands. Capt. Hunter, of the ship *Marshall Bennett*, recommends Cape Denis as an excellent place to procure a good supply of yams:—"At this place we procured twelve boat-loads—in fact, as many as we could find room for—of the finest yams I ever saw, in about six or eight hours; the cost being four bundles of iron hoops. And I think this might be depended on from May until December. In trading our boats pulled to the shore, and kept afloat; the natives wading out with the yams. It is better to be thus cautious, as the natives are very numerous, and treachery is a general trait in their character hereabout. For lying off and on there can be no better situation, under the lee of the land in smooth water, and shore steep-to, with no danger visible from the mast-head."*

* Nautical Magazine, January, 1830, p. 38.

To the West of Cape Denis is *Cape North*, the extremity of some low islands, which appear to be the westernmost land. Beyond this is a line of coral reefs, which were called the *Lusançay Reefs*. They extend to a very considerable distance; and indeed are more or less connected with a range of coral barrier reefs to the meridian of $150^{\circ} 40'$, where D'Entrecasteaux again encountered the land. This extensive line runs nearly on a parallel, and partakes of all the dangerous characteristics of the coral reefs—perpendicular borders, and detached outlying shoals, one of which D'Entrecasteaux particularly notices.

The COAST of NEW GUINEA.—The coast to the North was very imperfectly seen and delineated by D'Entrecasteaux. The first point more particularly noticed was *Cape Longuerue*, the South extremity of *Huon Gulf*. It is in lat. $7^{\circ} 22'$, and lon. $147^{\circ} 23' 45''$ (D'Entrecasteaux). To the N.W. is a group of low islands. The mountains of New Guinea are here prodigiously high, affording a magnificent spectacle. *Cape Cretin* is the North point of *Huon Gulf*. At 5 miles S.E. of it are three small low islands; the northernmost of these is in lat. $6^{\circ} 47' 45''$, lon. $147^{\circ} 50' 4''$.†

RICHE ISLAND lies to the N.W. of the land first laid down on this exploration, which is a portion of this great island. It is of considerable size, and tolerably high. Its North point is in lat. $8^{\circ} 2'$, lon. $147^{\circ} 57' 40''$ (D'Entrecasteaux).

CAPE KING WILLIAM is the West point of Dampier's Strait, and is elsewhere described.*

NEW IRELAND.

The N.E. side of this island was discovered by Le Maire and Schouten in 1616, and was again seen by Tasman in 1643; but these navigators supposed it to form a portion of the large Island of New Guinea. This supposition was disproved by Dampier, who sailed through the strait now bearing his name in 1700; but all the land to the eastward retained the name of *Nova Britannia* till 1767, when Carteret found that the bay, called by Dampier St. George's Bay, was in reality a strait separating it into two islands; the land to the eastward then received the name of *New Ireland*, that to the westward retaining the title of New Britain. Its native name is *Tombara*.

The island is very imperfectly known: with the exception of two or three points which have been more recently visited and better determined, we are obliged to resort to the accounts of the original discoverers, necessarily very imperfect authorities. According to these, the island extends 60 leagues in a N.W. and S.E. direction; the North side remains nearly unknown. The South side has been imperfectly examined by Carteret, D'Entrecasteaux, Hunter, and Duperrey.

CAPE ST. GEORGE is the southernmost point; and, from the observations of Duperrey at Port Praslin, it is in lon. $152^{\circ} 48' 14''$; D'Entrecasteaux places it in lat. $4^{\circ} 51' S$.

CAPE SANTA MARIA is the easternmost point of New Ireland; and hence the coast assumes a new direction, trending away to W.N.W. The land between

* D'Entrecasteaux's Voyage, by Rossel, vol. i. chap. xix. p. 403, *et seq.* The positions are corrected by D'Urville's observations, as detailed in M. Vincendon-Dumoulin's charts.

the two capes last named is high, mountainous, and wooded; numerous points jut out, forming as many fine bays.*

ST. JOHN'S ISLAND lies off Cape Santa Maria, and was so named by Tasman from the day it was first seen. Bougainville calls it *Bournand Island*. Dampier says it is 9 or 10 leagues in circumference, and well covered with large trees. Much cultivation was visible, and abundance of cocoa-nut trees. The people came off, and appeared friendly.

ANTHONY KAAH ISLAND of Tasman is probably the *Oraison Island* of Bougainville, who places it in $3^{\circ} 30' S.$ Both these navigators speak but of one, but Dampier (whose accuracy is proverbial) says:—"On the S.E. part of it are three or four small woody islands, one high and peaked, the other low and flat; all bedecked with cocoa-nut trees and other wood." The island itself is 4 or 5 leagues in circumference, high, well wooded and well cultivated, having abundance of cocoa-nut trees. On the North side of it is another island of moderate height, and rather larger than the high island. Dampier passed between them.† Off these islands to the eastward is a group called the *Fead Islands*.

FEAD ISLANDS, or ABGARRIS.—This group was discovered by Capt. Rennéck, of the *Lyra*, eight days after the discovery of the shoal so named. They occupy a space of 9 leagues in a N.W. and S.E. direction, and are composed of a chain of low islands and sand-banks, surrounded by a reef, the North part of which is in lat. $3^{\circ} 9' S.$, and lon. $154^{\circ} 22' E.$

GOODMAN ISLAND is the southernmost of the Fead Islands. It is separated from the rest by a channel which Capt. Rennéck could not examine, so that its safety is doubtful. To the South of this island is a detached shoal, with a reef, in lat. $3^{\circ} 33' S.$, and lon. $154^{\circ} 37' E.$ The greater part of the islands are inhabited, and they abound in cocoa-nut trees.

GERRIT DENYS ISLAND, another discovery of Tasman, is called by Bougainville *Ile du Bouchage*. Dampier says it is of an irregular figure, projecting points forming sandy bays in all parts. It is 14 or 15 leagues in circumference, high and mountainous, and very well wooded. In the bays are abundance of cocoa-nut trees. The timber appeared to be fine. The island was very populous, but the natives were considered to be treacherous and warlike. They will come off in canoes with cocoa-nuts, taro, plantains, &c., for barter to passing ships (1839).

LYRA SHOAL.—This reef was discovered, February 8, 1826, by Capt. Rennéck, commanding the ship *Lyra*, belonging to the well-known and enterprising merchants, Messrs. Enderby. It is a narrow belt of rock, extending 11 miles in a N.W. and S.E. direction, or from $14^{\circ} 8'$ to $15^{\circ} 9' S.$, the longitude being $153^{\circ} 28'$. The ship crossed the middle of this reef, and the coral rocks beneath were plainly seen, the depth being estimated at 4 or 5 fathoms.

DAMPIER ISLANDS.—Some islands were seen by Dampier, March 2, 1699. He does not give any detailed account of them, but states that to the N.E. of the larger island were two others, one small but woody, the other a league long, inhabited, and full of cocoa-nut trees. The latter was so narrow, that there was no shelter on the East side of it. The large island was thickly inhabited.

* Dampier, vol. iii. p. 207.

† *Ibid.* vol. iii. p. 204.

WISHART or FISHER'S ISLAND of Le Maire and Schouten, 1616, is called *Suzannet Island* by Bougainville. Its South extremity is 10 leagues W. by N. of Gerrit Denys Island, and consequently is in lat. $2^{\circ} 55' S$. The island lies North and South, and its North point is in lat. $2^{\circ} 32'$.

Maurelle mentions several other islands on the N.W. of New Ireland, but describes them very superficially. They are named *San Francisco*, *San Josef*, and *San Antonio*, but their existence and character require confirmation.

The COAST of New Ireland at this part is high and mountainous, and covered with fine trees. The sides of the hills are cleared and cultivated in many parts, and this with numerous smokes indicate a dense population.

SLINGER'S BAY is in this part; it is a point where Dampier, seeking anchorage, was deterred by the distance from the sea and the hostile appearance of the natives, who, on his returning, attacked him by slinging stones, but they were quieted by firing a gun.

CAPE BYRON is the N.W. extremity of New Ireland, and was thus named by Carteret, September 12, 1767. He determined the separation between New Ireland and New Hanover, calling the channel *Byron Strait*. It probably is not navigable; for Carteret says, there are several small islands in it, upon one of which is a remarkable peak, to which he gave the name of *Byron Island*; D'Entrecasteaux calls it *Mausolée Island*, and says the channel is filled with islets and rocks.

NEW HANOVER, the island to the westward, so called by Carteret, is stated by him to be high, finely covered with trees, among which are many plantations, the whole having a beautiful appearance. The South point was called *Queen Charlotte's Foreland*, in honour of the queen. The cape and the land in its vicinity are remarkable for numerous small hummocks. The island is still very imperfectly known. Tasman says that the North coast runs East and West, 10 or 12 leagues; his description in some degree identifies the channel, separating it from New Ireland (Byron Strait). Sailing to the westward, August 7, 1643, he passed four low islands, and then three others near noon; in the afternoon he came to a low point, before which lay two islands, which he named *Point Salemon Sweet*, after a member of the Council of the Indies. The coast then trended to the southward, so that it must have been the N.W. point of New Hanover.

The PORTLAND ISLES, which are alluded to by Tasman, were thus named by Carteret. He says they are six or seven in number, two of them being tolerably large. They were seen at a great distance.

SANDWICH ISLAND, to the South of the West end of New Ireland, was first distinguished as an island and so named by Carteret. Admiral Hunter describes it as of moderate height, and well covered with wood. It was passed on the South side. Its general direction was about E.N.E. and W.S.W., and in that direction is about 7 leagues (D'Entrecasteaux says 14 miles). It appeared to Hunter to be of considerable breadth at its eastern end, and narrow towards its western, where it terminates in a narrow point, off which lies a small woody island, with a narrow passage between it and the main island, to which it appears to be connected by a reef.

The channel between Sandwich Island and New Hanover is 7 miles broad.

Carteret says, on the North part of it is a remarkable peak, like a sugar-loaf, and opposite to it, on the coast of New Ireland, there is another; they are distant from each other about 5 leagues, according to Carteret (D'Entrecasteaux says, only half that distance), in a S. by E. $\frac{1}{2}$ E. and N. by W. $\frac{1}{2}$ W. direction. The peak on Sandwich Island, according to D'Entrecasteaux, is in lat. $2^{\circ} 55'$ S., lon. $150^{\circ} 44'$ E. Carteret says the island is pleasant, and well inhabited.*

ST. GEORGE'S CHANNEL separates New Ireland from New Britain; its true character was first determined by Carteret, in September, 1767. It was previously marked as a bay from Dampier. It is 6 or 7 leagues broad, and contains several islands, but would appear to offer a safe and convenient passage for ships passing to the North or South.

DUKE OF YORK ISLAND, or AMACATA, was discovered and named by Carteret. He describes it as level, and having a delightful appearance. Inland it is covered with lofty woods, and near the sea-shore are the houses of the natives, which stand not far from each other, among groves of cocoa-nut trees, forming a beautiful and romantic prospect. Carteret passed to eastward of it, the channel being about 8 leagues broad. Capt. Hunter gives a long account of the island and its inhabitants. He judged it to be about 10 miles long, in a S.S.W. and N.N.E. direction; not high, nor yet to be called low land, well covered with wood. From the observations made while on it, it was pronounced to be a perfect garden, as far as it could with propriety be called so in the hands of an uncultivated people. The soil, for richness, was beyond anything they had seen, exceeding Norfolk Island in that respect. It produces cocoa-nuts and the usual tropical fruits; hogs, poultry, &c., are kept by the natives. They were friendly at first, but afterwards inclined to be hostile.† The bay in which he anchored is on the N.W. part of the island, and was found to be convenient and safe at that season (May, 1791). Anchorage, in any part of it, in 25 to 15 fathoms; the shoalest water has the worst ground. The watering place is on the East side, from some rivulets; but as the tide flows up to the place whence the fresh water (which is very soft) is procured, it is best to fill from half-flood to half-ebb. The tide rises 5 or 6 feet. The bay was called *Port Hunter*, and lies in lat. $4^{\circ} 7' 30''$, lon. $152^{\circ} 22'$ E., according to Duperrey.

CARTERET'S HARBOUR is on the eastern side of St. George's Channel, towards the S.E. end of New Ireland. Carteret anchored here in September, 1767. It is formed by two islands and the main; the largest, which is to the N.W., was called *Cocoa-nut Island*, and the other, to the S.E., was called *Leigh's Island*. The channel is here 23 miles wide. Between the two islands is shoal water, and each of them forms an entrance into the harbour: the S.E. or weather entrance is formed by Leigh's Island, and in this there is a rock above water, named the *Booby Rock*; the passage is between the rock and the island; the rock has deep water all round it. The N.W. or lee entrance is formed by Cocoa-nut Island, and this is the best, because there is good anchorage in it, the water in the other being too deep. Carteret entered by the S.E. passage, and

* Carteret, in Hawkesworth, vol. i. p. 598; Hunter's Historical Journal, p. 238; D'Entrecasteaux, par Rossel, tome i. pp. 129-30.

† Hunter's Historical Journal, pp. 226-236.

quitted by the N.W. At the S.E. end of the harbour is a large cove, secure from all winds, and fit to haul a ship into. In the N.W. part of the harbour is another cove, from which very good water was procured; this, too, is fit to haul a ship into, and is very convenient to wood and water in; she may lie in from 30 to 5 fathoms, soft muddy bottom. The harbour runs about S.E. by S. and N.W. by N., and is about 3 miles long and 4 cables' length broad.* D'Urville watered here, and began his examination of New Britain opposite to it. The N.E. point of Cocoa-nut Island is in lat. $4^{\circ} 42' 0''$, lon. $152^{\circ} 44' 30''$.

GOWER'S HARBOUR, or PORT PRASLIN, is to the S.E. of Carteret Harbour, according to Carteret, 4 leagues distant, but Capt. Hunter, in 1791, was surprised to find it only 2 leagues. The first name was given to it by Carteret, the discoverer; the second by Bougainville, who anchored here, and observed an eclipse of the sun, July 13, 1768. He gives the following account of it. It is formed by a larger island, *Wallis or Marteaux Island*, and a smaller, *Green Island*, to the South of it.

"In entering, a small island (*Wallis Island*) and an islet (*Green Island*) will be left to port on the West; they are half a league from the coast; a point which projects opposite the islet forms within it an excellent harbour, sheltered from all winds, the bottom throughout of white sand, the depth from 30 to 13 fathoms. Off the East point is a breaker, but it is visible, and does not extend far off. On the North side of the bay there are two other banks, which uncover at low water. On the edge of the reefs there are 11 fathoms. The entrance of this port is very easy; the only attention required is to hug the East point close-to with plenty of sail, because as soon as it is doubled, you will be becalmed, and then you must proceed with the headway.

"There is excellent opportunity for watering here at four rivulets, all within 400 paces. The landing is excellent, without a rock or any swell. Wood may (or might) be had on the shore, excellent as firewood, and much of it beautiful for carpentry. There were no inhabitants, and this gave all the quietude desired; neither cocoa-nut, nor banana, nor other vegetable could be procured, but fish was abundant."†

Capt. R. L. Hunter says that a ship being in the neighbourhood of New Ireland or the Salomon Islands, and in want of water, firewood, or spars, cannot obtain these with greater facility or safety than in Gower's Harbour. The southern entrance to this harbour is about 2 miles from Cape St. George; either entrance will, however, be easily seen by a ship at a moderate distance in the offing. There is water in all the coves, but the northernmost has the finest stream, and either that or the southern cove will be found the most convenient. The most expeditious method is to drop anchor in 16 or 18 fathoms, then run a line to the shore, and haul your stern in. There is anchorage also on the North side of the East point of *Wallis Island*, in 28 or 30 fathoms, about 40 yards from the shore. You are so completely sheltered with the high land above you, in every direction, that a ship, in case of necessity, may select many places suitable for heaving out.

* Carteret, in Hawkesworth's Collection, vol. i. p. 504.

† Bougainville, pp. 273-4.

There is but one tide in the twenty-four hours, with about 3 or 4 feet rise and fall; the stream in the gut did not exceed $1\frac{1}{2}$ knots while we were there.

The timber grows to a great height, many of the trees being 80 or 90 feet, and perfectly straight, and of sizes from 9 feet in circumference downwards, the small being as tall as the large. No natives reside here. A few may come round the cape in fine weather, with some trifles to barter. Should refreshments be required, as they cannot be got here, they may be procured on the North side of New Ireland; the canoes will come off 5 or 6 miles to a ship, bringing taro, cocoanuts, plantains, and sometimes yams, which they barter for pieces of iron hoop, knives, hatchets, &c.*

NEW BRITAIN.

Dampier was the first to decide that this was a distinct island; prior to his voyage, it was supposed to form an integral part of New Guinea. Its southern side was examined by Dampier, and has been more recently and more exactly described by the celebrated D'Urville, under very adverse weather.† On the North side D'Entrecasteaux is the principal authority, though his observations were very imperfect for a survey. Its native name is *Birara*.

CAPE STEPHENS is the N.E. point of New Britain. The name was applied by D'Entrecasteaux to another headland to the West of it. North of it is an island, called by Carteret *Isle of Man*. This portion of New Britain forms a peninsula, and on its North part are some high land and three remarkable hills, close to each other, which Carteret called the *Mother and Daughters*. The Mother is the centre one, and the largest. They are very remarkable, and may be readily seen in clear weather at the distance of 20 leagues. Capt. Hunter says that a little way with the S.E. Daughter there is a small flat-topped hill or volcano, which emitted vast columns of black smoke, a fact to which Carteret also witnesses, but he saw the smoke behind the principal mountain.

To the East of these hills, and S.E. of Cape Stephens, is *Cape Palliser*. The interval between them is a bay, with low land near the shore, gradually rising into lofty hills towards the Mother and Daughters, and covered with extensive forests having many clear spots or plantations. It was supposed to be well inhabited.

Entrance Point (Pte. de l'Entrée) is the first point determined by D'Urville; he places it in lat. $4^{\circ} 52' S.$, lon. $152^{\circ} 15' E.$ *Cape Buller* is directly to the South of it, 20 miles distant.

* Nautical Magazine, January, 1839, pp. 37-8.

† Capt. D'Urville was very unfortunate in the weather he experienced off New Britain. He says:—"I am compelled to retract the favourable opinion I had formed of it from the narrative of Dampier, and the conjectures of the president Desbrosses. If the latter had experienced the miseries of our voyage, he would not certainly have chosen this country as the site of the colony he wished to establish in this part of the globe. Never, in any country, have I observed anything approaching to the torrents of rain with which we were inundated for twelve whole days. Bougainville and D'Entrecasteaux experienced similar weather at the anchorages at Praslin and Carteret. We were more fortunate, and generally had fine weather at Port Praslin. But it would seem as if these were rare cases, and are not to be calculated on."—Vol. iv. p. 531, July, 1827. It may be observed, however, that notwithstanding the continued bad weather, and the very arduous duties on board the *Coquille*, there was not a single sick person except the commander, who suffered from other causes.

"At noon we found ourselves at 10 miles to the E.S.E. of Cape Buller, before a deep embayment, which exists between Cape Buller and Cape Orford, and which in this part must reduce the connexion of the North part of New Britain to a narrow isthmus. From this part the peak, which corresponded very well with D'Entrecasteaux's *Deschamps Peak*, was very remarkable in the West. The deep and spacious bay spoken of above was not sufficiently made out to affirm that it may not disconnect the two portions of New Britain; but if so, the channel must be narrow, and was not distinguished from the offing."*

CAPE ORFORD,† which is at the South point of this bay, and the S.E. point of New Britain, is composed of three rounded points, backed by very high mountains. It is in lat. $5^{\circ} 24'$, lon. $152^{\circ} 4'$. The land near the sea, though generally covered with trees, is in some parts apparently cleared, which would lead to the supposition that some cultivation exists. Not far from the shore the water changes colour, but this must arise from the nature of the bottom, as neither reefs nor rocks were seen, and the swell seemed to break directly on the shore, and Cape Orford itself is a very high and perpendicular cliff, overhung with enormous mountains, some distance inland.

Between *Quoy Peak* (lat. $5^{\circ} 37'$, lon. $151^{\circ} 47'$) and Cape Orford, a distance of 25 miles, the coast is uniformly high, steep, and covered with thick forests. Quoy Peak is an immense mountain, and very remarkable from its isolated position. It is in the form of a very regular cone, viewed from seaward. *Point Owen* is in this portion of the coast, near to Cape Quoy. The smoke from a small island indicated natives.

Jacquinet Bay lies to the West of Cape Quoy, and is terminated to the S.W. by *Cape Cunningham*.

PORT MONTAGU was also named by Dampier in honour of his noble patron. He was here in March, 1699. He watered in a small river in its N.E. part, and here also he procured wood, and bartered for provisions, pigs, &c., with the natives, who he found rather disposed to be troublesome, though his treatment did not warrant much else. Capt. D'Urville, when here in July, 1827, experienced a long continuance of very bad weather, which prevented a more close examination of Port Montagu. Its eastern point was named *Point Dampier* by him, and he states it to be a high, steep, and conspicuous promontory. He also saw in the bay, but did not visit them, three islands of various sizes, one of which was remarkable from its conical form. He was unable to trace farther this important part of New Britain, but saw sufficient to be assured that the coast is continuous, and to affirm that there is no passage through, though the land is here reduced to a very narrow neck.‡

Dampier says:—"The country hereabouts is mountainous and woody, full of

* D'Urville, vol. iv. pp. 321—323.

† Cape Orford was thus named by Dampier in honour of his noble patron. "The land trends from this cape N.W. by W. into the bay, and on the other side S.W. by compass, which is S.W. 9° W., allowing the variation, which is here 9° East. The land on each side of the cape is more savannah than woodland, and is the highest on the N.W. side. The cape itself is a bluff point, of an indifferent height, with a flat table-land on the top. When we were to the S.W. of the cape it appeared to be a low point shooting out."—(March, 1699.)—*Dampier*, vol. iii. pp. 208-9.

‡ D'Urville, vol. iv. p. 529.

rich valleys, and pleasant fresh-water brooks. The mould in the valleys is deep and yellowish; that on the sides of the hills of a very brown colour, and not very deep, but rocky underneath, yet excellent plant land. The trees in general are neither very straight, thick, nor tall, yet appear green and pleasant enough, but all unknown trees. Cocoa-nut trees thrive very well here; as well on the bays by the sea-side as more remote among the plantations. The nuts are of an indifferent size, the milk and kernel very pleasant. Here are ginger, yams, and other very good roots for the pot, that our men saw and tasted. What other fruits or roots the country affords, I know not. Here are hogs and dogs; other land animals we saw none. The fowls we saw and knew were pigeons, parrots, cockadores, and crows, like those in England, a sort of bird about the bigness of a blackbird, and smaller birds many. The sea and rivers have plenty of fish; we saw abundance, though we caught but few, and these were cavallies, yellow-tails, and whip-rays."*

Westward of this D'Urville saw but imperfectly from the bad weather. At one time he saw, through the driving rain, that the coast extended to the W.N.W., when it was terminated by a low island. All the land seen was also very low, covered with large trees, and apparently composed of a crowd of islets lying before the coast of New Britain. The land of this, much more elevated, receded farther into the interior, and was rarely visible, on account of the squalls of rain and fog.

Along the coast there extended a belt of troubled water, which reached above 4 miles off the coast, the direction of which appeared to be from East to West. It formed a very distinct line of demarcation with the sea in the offing, and he was obliged to cross a portion of it.

M. D'Urville remarks that the weather was so very bad, the currents so variable, and consequently the difficulties of their navigation and examination of this almost unknown coast (for Dampier's very imperfect sketch afforded but little service) so great that it is more imperfectly delineated by M. Lottin than that of any other portion of the countries explored by the *Astrolabe*.

The *Roos Islands*, which are low, lie about 30 miles N.W. from Cape South; and at about the same distance to the W.N.W. of these again is a considerable group, which D'Urville named the *Gracious Isles* (Iles Gracieuses). The land of New Britain itself, which was imperfectly seen at intervals, consists of high mountains.

DAMPIER STRAIT is limited on the East by the West extremity of New Britain, and on the West by an island which he named *Sir George Rook's Island*. It was the discovery of this passage that caused Dampier to name the island to the East Nova Britannia, it having been previously represented as part of New Guinea.

According to the examinations of D'Entrecasteaux and D'Urville, the greater portion of the southern entrance to Dampier's Strait is obstructed by dangerous reefs, on which both the ships of these commanders nearly met with serious accidents. Dampier was more fortunate, though he notices these coral reefs, so

* Dampier, vol. iii. pp. 216-7.

that it is probable that there are channels between. To avoid them you must keep near the coast of New Britain. D'Urville was set nearly 20 miles to the West in the course of the night when to the southward, and this ought to be carefully considered in traversing it.

Of the western part of New Britain all speak in high terms. Dampier says:—"The East land (of the strait or passage) ends with two remarkable capes or heads, distant from each other about 6 or 7 leagues. Within each head were two very remarkable mountains, ascending very gradually from the sea-side, which afforded a very pleasant and agreeable prospect. The mountains and lower lands were pleasantly mixed with woodlands and savannahs. The trees appeared very green and flourishing, and the savannahs seemed to be very smooth and even; no meadow in England appears more green in the spring than these. We saw smoakes, but did not strive to anchor here; but rather chose to get under one of the islands (where I thought I should find few or no inhabitants), that I might repair my pinnacle, which was so crazy that I could not venture ashore anywhere with her. As we stood over to the islands we looked out very well to the North, but could see no land that way; by which I was well assured that we were ~~not~~ through, and that this East land does not join to New Guinea; therefore I named it Nova Britannia. The N.W. cape I called *Cape Gloucester*, and the S.W. point *Cape Anne*; and the N.W. mountain, which is very remarkable, I called *Mount Gloucester*."*

M. D'Urville, who was here in August, 1827, in equal terms of admiration says of it:—"Rarely has nature imprinted so delicious an aspect on a country untouched by the hand of man, with such an agreeable diversity of surface, and beautiful effects of perspective. The coast throughout quite safe, accessible, and washed by tranquil waves; the land gently rising in the form of an amphitheatre in various places, here and there shaded by dark forests, or by less thick vegetation; and more particularly by extensive tracts of greensward, the yellowish tints of which contrasted richly with the darker shades of the more sombre forests and woods surrounding them. The two peaks of Mount Gloucester crowned this smiling scene with their imposing masses, their majestic summits frequently hidden in the clouds. In all the western quarter, and at 12 miles' distance, our horizon was occupied by the undulating lines of Rook Island, which, with New Britain, forms the Strait of Dampier."†

From some good observations made by M. Jacquinot, on board the *Astrolabe*, the longitude of the West Cape of New Britain was found to be $148^{\circ} 17' 2''$, measured from Carteret Harbour, and which only varied two minutes from that by D'Entrecasteaux; the mean (which is given above) is therefore taken.

VOLCANO ISLAND, which served as a beacon to Dampier, who discovered it on the evening of March 24, 1700, according to D'Urville's observations, is in lat. $5^{\circ} 32' 20''$ S.; Dampier says, lat. $5^{\circ} 33'$, a proof of his accuracy. The latter, in his account of it, says:—"The island all night vomited fire and smook very amazingly; and at every belch we heard a dreadful noise like thunder, and saw a flame of fire after it, the most terrifying I ever saw." The funnel (crater) was on

* Dampier (March, 1700), vol. iii. p. 220.

† Voyage de *L'Astrolabe*, tome iii. pp. 537-8.

the South side, so that he could not see the eruptions so plainly after passing it. D'Entrecasteaux, who passed it in 1793, found it yet enveloped in smoke. When D'Urville passed it, in August, 1827, the crater was quite extinct, and its surface, without trees, was nevertheless clothed with an agreeable verdure on the eastern face. Its form is that of a very regular cone, broken at the summit, about 2,500 feet, and its diameter at the base about 3,700 feet. The form of this protuberance and its remarkable escarpment on all its faces sufficiently indicate that it has arisen directly from the depth of the ocean, and that it was probably the last of these burning masses which were still increasing two centuries ago, like a chain of volcanic spirals on the North of New Guinea.

ROOK ISLAND, which, as before mentioned, was named by Dampier after Sir George Rook, is about 22 miles in length, and 10 or 12 broad. Its N.W. point is *Cape King*. It is formed inland of high and imposing mountains. It is in lat. $5^{\circ} 29'$, lon. $147^{\circ} 46'$.

TUPINIER ISLAND, which was seen, but not named, by Dampier or D'Entrecasteaux, lies to the North of Volcano Island; it is very high, and falls in gentle declivity in every direction to the sea. It is not more than 12 miles in circuit, and is most probably inhabited, for smokes were observed in different parts. Lat. $5^{\circ} 26'$, lon. $148^{\circ} 4'$.

It is to the voyage of D'Entrecasteaux that we owe what little knowledge we have of the North coast of New Britain. But there is a melancholy interest in this; it was the last of the labours of that commander, who shortly after died in hurrying back to Java to recruit.

MERITE ISLAND is the first point named in this exploration; it was first seen June 30, 1793. It is tolerably high, and its highest part is in lat. $4^{\circ} 54'$, lon. $149^{\circ} 5' 0''$. To the North of it are several other islands, the easternmost of which appeared to be the largest. This was called *Des Lacs Island*, and the group *Françaises Islands*. They all appear to be tolerably high, and their coasts, as far as could be seen, were quite clear; but off the S.W. point of *Forestier Island* there are several islets, the outermost of which is rather more than a league off.

Willaumez Island, which is to the S.E. of *Des Lacs Island*, is tolerably high in the centre, but the extremities are very low. The trees which cover it from the sea-shore to its summit indicate great fertility. There were no houses near the beach, and it would have been supposed to be uninhabited if it had not been for some smokes rising inland. On the middle of the West side of it a large bay appears as if it would afford good anchorage, but it is open to the West. The island, being small and apparently quite uncultivated, would seem as if but few resources could be gained from it. Its South point is in lat. $5^{\circ} 15' 3''$, lon. $149^{\circ} 58' 10''$.

To the South of *Willaumez Island* are two other islands, very much smaller and much wooded; they were called *Raoul Island* and *Gicquel Island*. *Du Portail Island* lies 20 leagues to the East of *Willaumez Island*. D'Entrecasteaux saw it at 12 leagues' distance. When within 7 or 8 leagues it was seen that three small islets lie off its western extremity; they were very lofty for their extent. The high land of New Britain was seen at the same time beyond it.

The whole of the North side of New Britain, or as far as was seen, appeared to be lofty, for the coast was visible while examining the *Françaises Islands*.*

Cape Lambert is a name given by Krusenstern to the cape taken by D'Entrecasteaux for Cape Stephens, but which lies to the East of it. He places it in lat. $4^{\circ} 12' S.$, and lon. $151^{\circ} 41'$. The coast between this and Cape Stephens, described at the commencement, has not yet been examined. North of Cape Lambert is a reef marked on some charts as *Princess Royal Reef*, on others as *Sherwood's Reef*. Still farther North is *Legelis Shoal*. To the West of the cape another is called *Coop-to-do-Choose Reef*. Another, the *Father and Son*, lies to the N.W. of it; and S.W. of this are the *Horton Banks*. All these have been recently placed on the charts, which must be consulted for their positions.

SQUALLY ISLAND; KERUE ISLAND; TENCH ISLAND.—In February, 1700, Dampier discovered an island, which he named *Squally Island*, lying 6 or 8 leagues to the East of St. Matthias (which he took for the Vischers Island of Tasman). He describes it as being rather flat. Bougainville gives nearly the same description, and says *Kerué* is 3 leagues in length. He adds, that between it and St. Matthias there is an islet, which is probably the same as that which Dampier places to the S.W. of Squally Island. Lieutenant Ball, in the *Supply*, discovered, May 19, 1790, two islands, which he named *Tench Island* and Prince William Henry Island. The former of these agrees in position with Kerué Island, but not as to dimensions. Lieutenant Ball places Tench Island in lat. $1^{\circ} 39' S.$, lon. $150^{\circ} 30' E.$, and states that it is not more than 2 miles in circumference, while Kerué, or Squally Island, is stated to be 2 or 3 leagues long. Neither of these estimates are probably exact, for Ball supposed Tench Island to have a population of 1,000 souls, too large a number for so small an area. Until something more accurate be known, it may be supposed that these three islands are identical.

ST. MATTHIAS ISLAND; PRINCE WILLIAM HENRY ISLAND.—The first of these was discovered by Dampier, who took it to be Tasman's Vischers Island. He says it is lofty, and 9 or 10 leagues in extent. Lieutenant Ball discovered an island, which he called *Prince William Henry Island*, in lat. $1^{\circ} 32' S.$, and lon. $149^{\circ} 30' E.$ From the centre of this island, which lies in an E.N.E. and W.S.W. direction, a high mountain (visible 15 or 16 leagues) rises. From these descriptions Admiral Krusenstern has no doubt but that both are identical.

Besides these two islands, Bougainville places on his chart two islets between them, and a third to the West of the N.W. point of St. Matthias Island. Whether all these exist or not remains a problem, but that one other island at least exists in this neighbourhood is somewhat confirmed by Capt. Bristow, who mentions seeing three islands, Tench Island, the easternmost to the North of New Hanover, and Kerué Island, distinct from it to the westward.†

ADMIRALTY ISLANDS.

This group, still most imperfectly known, was discovered by Le Maire and Schouten, in July, 1616; they merely sailed past them to the southward, and

* Voyage de D'Entrecasteaux, par Rossel, tome i. pp. 432—439.

† See Purdy's Tables to Oriental Navigator, p. 106.

called them the *Twenty-Three Islands*. In 1761 Carteret saw the principal island, and twenty or thirty smaller ones to the South of it; he gave them the name by which the group is now known. In 1781 Maurelle saw them, and named several of the easternmost. D'Entrecasteaux passed along the northern side of the chief island in July, 1792; he was in great hope of succeeding here in the object of his voyage, the discovery of the fate of La Pérouse's expedition.

The principal island of the Admiralty Group is mountainous. The inhabitants are not very black; their physiognomy is agreeable, and differs but little from that of Europeans; they appear unsociable and thievish: the chiefs seem to have great authority; they are armed with darts, headed with obsidian or volcanic glass. The men wear a shell, the *bulla ovum*; with this exception they are entirely naked. The women only have a garment round the waist. They appear to live principally on cocoa-nuts, which are abundant on the islands. Their hair is curly, and of a black colour; they sometimes redden it with ochre mixed with oil; some parts of the body are thus painted, and especially the face.*

ADMIRALTY ISLAND, the largest, is 17 leagues in length from East to West, according to D'Entrecasteaux; he places the centre of the island in lat. $2^{\circ} 18' S.$, lon. $146^{\circ} 44' E.$ The North side, as well as those on the West and South, are surrounded by islets and rocks. Off the N.E. point of the island are the islands called by Maurelle *Los Negros*. They are small, very pleasant in appearance, covered with cocoa-nut trees, but surrounded by reefs. The North point of the easternmost of this group D'Entrecasteaux places in lat. $1^{\circ} 58' 50''$, lon. $147^{\circ} 16' 50''$.

JESUS MARIA ISLAND is tolerably large, but very dangerous to approach; it is surrounded by a reef, having still water within, and unfathomable off its outer edge. It does not appear to be much cultivated, and is of a disagreeable appearance. But few natives are seen, and apparently it cannot be thickly populated. The S.E. point of the island is in lat. $2^{\circ} 22'$, lon. $147^{\circ} 48'$.†

LOS REYES, in lat. $1^{\circ} 59'$, lon. $148^{\circ} 2'$, were nearly proving fatal to D'Entrecasteaux's ships. They were drifted against them by a violent current. The channel separating the western and middle islet is closed by reefs and shoals. The ships passed through a narrow channel, two or three cables' length wide, bounded to the West by a very dangerous bank, which joined on to the centre islet.‡

LA VANDOLA, the easternmost of the archipelago, is less than 3 miles in circumference. It is covered with cocoa-nut trees. It is thickly populated by an apparently happy and contented people. At some distance off, the island appears like an isolated rock; it is 6 or 7 leagues distant from the other islands, which are close together, but a nearer approach to it shows it to be pleasant and very fertile. Its centre is in lat. $2^{\circ} 14' S.$, lon. $148^{\circ} 10' 16'' E.$ The island is too small to afford shelter to leeward of it. It is the Circular Island of D'Entrecasteaux, in the accounts of whose voyage, by Labillardiere and Rossel, a long description is given.

* See Voyage in Search of La Pérouse, p. 174, *et seq.* † D'Entrecasteaux, vol. i. p. 162.
‡ D'Entrecasteaux, vol. i. p. 443.

The islands to the South of the principal island, which appear to be numerous, are not described. The charts must furnish the only guide we possess.

Capt. Abraham Bristow sailed through this part of the archipelago in the *Sir Andrew Hammond*, in February, March, and April, 1817, and discovered several islands, the account of which he gave to the late Mr. John Purdy, whose hydrographical labours are so well known.

HAYRICK and PLATFORM, two of these, are two small islands lying close together, and surrounded by a reef. To the S.W. of the Hayrick is an isolated rock, which forms part of the group, being only half a mile distant. The ship *Sir Andrew Hammond*, on May 19th, 1817, being at 12 miles to the East of this group, had the following bearings of four islands:—Small *Round Island*, N. 80° W., 21 miles distant; High Island, N. 50° W., 11 miles; Low Island, N. 20° W., 19 miles; and the fourth (in lat. 2° 24' S., lon. 147° 36' E., consequently near the position assigned by Maurelle to *San Miguel Island*), N. 45° E., 23 miles distant.

ELIZABETH ISLAND lies 22 miles S.W. of the preceding, also discovered by Capt. Bristow. It is inhabited, low, and well covered with trees. It is 2 miles long in a N.E. and S.W. direction; and connected with it is a surrounding reef, which has double the extent. Landing can only be effected at a single point, in the N.E. part of the island. The latitude is 2° 55', and the longitude, 146° 49'. At 2 miles East from this is a small island, the diameter of which is nearly a mile. There is a lagoon in the middle.

PURDY ISLANDS, a group named after Mr. Purdy, by his friend, Capt. Bristow, February 16, 1817. *Bat Island*, the westernmost, is scarcely 2 miles long; it is covered with large trees, and has two hummocks on it, which at a distance appear like two separate islands. *Mouse* and *Mole Islands* are two small islands to the East of the preceding. They are separated by a channel, through which the *Sir Andrew Hammond* passed, and found it excellent. *Mole Island*, the north-westernmost of the two, is in lat. 2° 51' S., lon. 146° 15' E.

Latent Reef is 4 miles in extent, and lies 4 miles to the West of *Mouse Island*. The northern part of this reef appears like a solid bed of rocks. There are two other reefs near these; one, 7 miles S.W. of *Bat Island* and 19 miles West of *Latent Reef*; and another, in lat. 2° 25' S., lon. 146° 22' E.

A strong current, bearing from West to East, was experienced here by Capt. Bristow, in the season above mentioned, February to March.

Three dangerous shoals have been stated by Capt. Horsburgh to exist 15 leagues to the South of the Admiralty Islands. They are nearly in the same latitude, so that it is possible, from the necessary imperfection of the observations made as to their position, that they may be identical. Still there appears to be so many isolated dangers in the neighbourhood, that all caution is required.

SHERBURNE Shoal is the easternmost, discovered by Capt. J. White in the *Sherburne*, May 15, 1824. It extends from East to West about 12 or 13 miles, and 8 miles from North to South; on its S.E. part is a dry sand-bank, and some rocks, which rise 20 feet above the water, in another part. Latitude of the S.E. part, about 3° 15' S., longitude, by chronometer, 148° 16'.

CIRCULAR REEF, discovered by Capt. Renneck in the *Lyra*, November 7,

1825, is 3 or 4 miles in diameter, having deep water inside, with an opening in its N.N.W. part. Lat. $3^{\circ} 18' S.$, lon. $147^{\circ} 40' E.$

SYDNEY SHOAL, on which the *Sydney*, Capt. Austen Forrest, was wrecked, May 20, 1806. It is covered at high water, but at low tide some rocks appeared above the surface. Lat. about $3^{\circ} 20' S.$, lon. $146^{\circ} 50' E.$

ALBERT REEF is in lat. $3^{\circ} 57'$, lon. $148^{\circ} 10'$. *Victoria Reef* is in lat. $4^{\circ} 16'$, lon. $147^{\circ} 57'$; and *Gipps' Reef* in lat. $4^{\circ} 16'$, lon. $149^{\circ} 16'$. These three last are from the charts.

ANACHORÈTES ISLAND (Anchorites Island) was discovered by Bougainville, August 7, 1768. It is a flat island, about 3 leagues long, covered with trees, and separated into several divisions, connected by reefs and sand-banks. Lat. $0^{\circ} 54' S.$, lon. $145^{\circ} 30'$. There is a great quantity of cocoa-nut trees on the island, and the sea-shore is covered with so great a number of houses, that it must be extremely populous. The natives were fishing in canoes off the island, and they appeared to be happy and contented. At 3 leagues to the West of it another low island was seen from the mast-head (Commerson Island). It is 5 leagues W. by N. from the northernmost of the Anachorètes, and in lat. $0^{\circ} 45' S.$, lon. $145^{\circ} 17'$.—(Bougainville, pp. 290-1).

LOS MONJOS (the Monks).—Four small low islands, which extend nearly 5 miles in an East and West direction. Maurelle first saw them in 1781, and determined their position to be in lat. $0^{\circ} 57' S.$, lon. (corrected) $145^{\circ} 41'$. Capt. Hunter also saw them.

BOUDEUSE ISLAND was named by Bougainville after his ship, August 9, 1768. It is low, and in lat. $1^{\circ} 26'$, lon. $144^{\circ} 34' E.$

L'ECHIQUEUR (the Chess-Board), so named by Bougainville, consists of a large collection of islets. D'Entrecasteaux placed upwards of thirty on his chart, but states that it is probable that in the North part of it many were not seen. They are only a series of low, flat islets, covered with wood. They all appear to be connected by reefs. The South point is in lat. $1^{\circ} 40' 30''$, lon. $144^{\circ} 3'$.

LOS EREMITANOS, or **HERMITS**, were seen by Maurelle at 8 leagues distant. They are described by D'Entrecasteaux as being high in the N.W. part, and seemed to leave considerable intervals, but, on a closer approach, they terminate in low lands, and are enclosed in a very narrow belt of sand, within which is a large space of still water. They are inhabited; the natives came off in canoes, and apparently were friendly. Their position was perfectly determined; the N.E. islet is in lat. $1^{\circ} 28' 30'' S.$, lon. $145^{\circ} 7' 45''$.

MATTY and DUROUR ISLANDS.—Two small flat islands, discovered by Carteret, September 19, 1767. According to D'Entrecasteaux the first is in lat. $1^{\circ} 33' 40'' S.$, lon. $143^{\circ} 12' 30''$, and the second in lat. $1^{\circ} 46' 0'' S.$, lon. $142^{\circ} 56'$. Carteret places them in lat. $1^{\circ} 43' 21''$, lon. $143^{\circ} 2' E.$

TIGER ISLAND is a discovery of Capt. Bristow in 1817, and communicated by him to Mr. Purdy. It is about 6 or 7 miles in length, East and West, and inhabited by a ferocious race of savages. Lat. $1^{\circ} 45' S.$, lon. $142^{\circ} 20' E.$

NORTH COAST OF NEW GUINEA.

It will be unnecessary to enter into any general description of this extensive island. Its features, as far as they interest the mariner, will be found in the ensuing description, which is chiefly derived from Admiral D'Urville.

DAMPIER STRAIT has been before alluded to. The best channel through it is on the New Guinea side, keeping the beach in sight, 6 or 7 miles distant.

ROCKY ISLAND of Dampier's chart, or LOTTIN ISLAND of D'Urville, is an immense cone of 3,000 or 4,000 feet in height, covered with verdure, with an habitable belt on the sea-shore, without doubt occupied, as was announced by several smokes. A large hollow on its N.E. side still indicates the situation of an ancient crater.*

LONG ISLAND is remarkable, as Dampier says, who so named it, for two very projecting peaks, one lying on the North and the other to the South of the island, and which D'Urville named *Reaumur* and *Cerisy Peaks*. The surface of the first is much cut up, and very irregular, and appears to have been a volcano. The island itself has been incorrectly named by Dampier, who probably thus termed it "Long" from the first appearance it presented to him; for it has rather a round figure, and its circuit is at least 40 miles. The soil in the neighbourhood of the shore seemed to be more arid than on any other of the islands, and neither cocoa-nut trees nor any trace of inhabitants were seen.†

Off its western point a reef runs out, on which the *Astrolabe* was nearly being drifted by the current.

CROWN ISLAND, also named by Dampier, from its "towering up with several heads or tops, something resembling a crown," is about 7 miles to the N.W. of Long Island. It is about 4 or 5 miles in circumference, and of a very great height (2,000 feet). The land, as it appeared to D'Urville, though very irregular, did not present these "heads and tops" from which Dampier named it. Perhaps these asperities have been partly effaced by time covering them with forests, or that Dampier, by passing nearer, could better see its irregularities. Neither smokes nor inhabitants were seen from the *Astrolabe*, and the sea was so calm that it is most likely, had it been peopled, their canoes would have come off. Dampier states that he saw many rocky reefs running off from the points of Crown Island to the distance of a mile, but D'Urville states that they are much nearer.

CAPE KING WILLIAM is very high, and may be seen above 20 leagues distant. It is in lat. $6^{\circ} 16' S.$, lon. $147^{\circ} 40'$. It was discovered and named by Dampier, March 25, 1700. It was also seen by D'Urville. The coast to the westward of it is composed of the immense *Mountains of Finisterre*, which extend nearly to Astrolabe Gulf, 120 miles farther along the North coast. The mountains were roughly computed by Capt. R. L. Hunter to be 13,000 feet high. The interval has not been explored.

ASTROLABE GULF, so named after D'Urville's vessel, lies between *Capes Rigné* on the East, and *Duperré* on the N.W., about 24 miles apart, the depth of

* D'Urville, vol. iii. p. 543.

† *Ibid.*

the gulf being about 18 or 20 miles. The Finisterre Mountains become lower when near the gulf, which is completely surrounded by a line of mountains, even in the bight of the gulf. On this part a great number of smokes was observed.

Cape Croisilles, a well-marked promontory, lies 10 or 11 miles North of *Cape Duperré*. North and South of this cape the coast offers a very agreeable prospect. The numerous and verdant savannahs which intersect the forests give it an appearance of cultivation. The mountains are moderately elevated, and have a very varied aspect in their scenery. There is no danger off the coast, and the *Astrolabe* passed along it within 5 or 6 miles, so as to observe all its details.

SIR R. RICH'S ISLAND of Dampier lies to the N.E. of these points. It is of a similar nature to those already described, and resembles more particularly Crown Island, but is a little larger and not quite so high. Lat. $4^{\circ} 49'$, lon. $146^{\circ} 13'$.

DAMPIER ISLAND, which is nearer the coast, is certainly not less than 5,000 feet high, in the form of a cone, pointed at the summit, but enlarged at the base to 36 or 40 miles in circumference. Although it appeared capable of cultivation, there was not any smoke or sign of inhabitants seen from the *Astrolabe*. A white cloud hung stationary over its summit, rarely allowing it to be visible, and was doubtless the cause why it was not seen from the *Coquille*, under M. Duperrey, in August 25, 1823.* It is called Burning Island in Dampier's sketch.

FRANKLIN BAY is 32 miles N.W. of Cape Croisilles, and is limited on the North by Cape Gourdon, which forms a well-marked promontory, though slightly elevated. In general, in proceeding to the westward, the coast sensibly decreases in height.

To the West of Cape Gourdon, between it and a tolerably deep bay, 20 miles distant, the coast is steeper and higher; the sea-coast presents many pleasant sites. In front of this bay are two islets, the *Legoarant Isles*, and on the North point of it is a village composed of a few houses.

VULCAN ISLAND is an immense cone, clothed with the most beautiful vegetation, and is not more than 12 miles in circumference. It is tolerably well fixed in position, and nothing can render navigation more simple and easy than these peaks planted on the surface of the ocean, serving as beacons for ships to steer by in passing along an unknown coast.

At 2 miles to the N.W. of Vulcan Island there is another island, very much smaller, but still very high; it was named *Aris Island* by M. Duperrey, and is incorrectly figured by him as two islets.

W.S.W. of Vulcan Island, a fine small bay presents another small islet, *Laing Island*. Its shores are covered with clumps of cocoa-nut trees; under their shade numerous houses were seen, and by the aid of the telescope many groups of natives were observed watching the progress of the corvette.

Westward of this bay the coast is very low, and covered with large trees, and

* This vessel passed within 8 leagues, and it may be seen at twice that distance. Capt. D'Urville expresses great surprise that M. Duperrey, in *La Coquille*, should have kept so far off such an interesting and unknown coast, when he was so well found in anchors and cordage, the want of which he bitterly laments, as it hampered him exceedingly in his explorations in August, 1827.—*Voyage de L'Astrolabe*, tome iii. p. 549.

in crossing an open bay, above which *Mount Jullien* rises, the *Astrolabe* suddenly entered into discoloured water, first greenish and then quite yellow. The crew became fearful of danger, and consequently, with much regret, they bore off the coast. D'Urville was convinced that the discoloration arose from the outlet of some large river in the neighbourhood, but it prevented him from examining the 20 leagues of coast lying between *Cape Della Torre* and *Gressien Island*, and he was persuaded that there was no danger, and that this part of the coast was well peopled. There was every reason to believe that it was at this part of the coast that Le Maire and Schouten had communication with the inhabitants in their canoes, July 7, 1616. The houses and people had a perfect resemblance to Papuas; the former being raised on piles 8 or 10 feet above the ground.

The SCHOUTEN ISLANDS, which lie off this part of the coast, are eight in number. They are very high and conical, which denote an igneous origin. Their height contrasts singularly with the low elevation of the land of New Guinea near them. They are covered with wood, and the main land, very low near the sea, is mountainous within.

LESSON ISLAND is the easternmost of the range; and 5 miles West from it is Blossville Island. The first is a very high cone, tolerably regular, and 5 or 6 miles in circuit; the other is one-third the size, and one-half the height. Both may be safely approached, and are covered with a rich verdure.

Garnot Island, to the North of Blossville, is a tolerably regular cone, of 7 or 8 miles in circumference, accompanied by a small islet on its S.W. part.

Jacquinot Island, to the W.N.W., is more irregular in form and less in altitude. It is very pleasant in appearance, being agreeably varied by level beaches, scattered with clumps of cocoa-nut trees, and hills covered with shady woods.

Deblois Island is 16 miles W. by N. of Jacquinot Island. It is small, and very much lower than any of the rest.

During the passage of the *Astrolabe* past these islands, after leaving Cape Della Torre, they were continually passing trunks of trees, entire trees, sugar-canes, stems of the *arum*, tufts of the *pandanus* or screw palm, and quantities of the fruit of the *barringtonia*. There is no doubt that these drifts were brought down from the interior of New Guinea by some considerable river or torrent which falls into the sea near Cape Della Torre.

ROISSY ISLAND, 8 miles N.W. of Deblois Island, is larger than any of the preceding, being not less than 12 miles in circumference. It is hilly, and clothed with the most agreeable vegetation. A belt of superb cocoa-nut trees embellishes its shores, and elegant palm trees, overtopping the rest of the trees, covered the hills to their summits. No signs of inhabitants had been observed on any other of the Schouten Islands, but from Roissy three canoes were launched to reach the *Astrolabe*, but they were not spoken with, nor did any of D'Urville's party land there.

D'URVILLE ISLAND is 24 miles W.S.W. of Roissy Island, and is very near the coast of New Guinea. It is moderately high, about 8 miles long by 2 or 3 only in breadth, and at its West point there is a pleasant bay, which apparently would afford good anchorage, and surrounded by a fine beach. This island is only

separated by a very narrow channel from *Gressien Island*, which at first sight would only seem to form a portion of it. To the West of this, and very near the coast, are two or three small low islands, which received the name of *Paris Islands*.

The coast of New Guinea at this part is low land near the shore, with high mountains in the interior. The part S.E. of D'Urville and Gressien Islands was not examined by the *Astrolabe*, but is called *Cornelis Bay*.

At 14 miles westward of the last-mentioned islands are two small low islands, about 10 miles distant from the shore. The easternmost of these was called *Guilbert Island*, and is about 4 miles in length, and at its East point is a very small islet, covered with a clump of large trees, and surrounded by a reef.

A channel of half a mile wide at most separates it from the westernmost, or *Bertrand Island*; the latter is not above $2\frac{1}{2}$ miles in extent. Both of them are very low, and clothed with a pleasant verdure. At the moment the *Astrolabe* was passing, four canoes, each with five or six natives, came out from the reef at the East point of Guilbert Island, and attempted to reach her, but the current rapidly drifted her to the westward, and the natives were obliged to give up the pursuit.

The whole of these islands were seen, but not named, by Dampier, as he has rudely drawn them in the chart accompanying his excellent volume. The foregoing description is taken chiefly from the voyage of the *Astrolabe*, in August, 1827, that ship being the first that accurately examined them, and applied the names here given to them, being those of the officers of that ship.* Dampier describes (vol. iii. pp. 223-4) one of those singular phenomena, a water-spout, he encountered here. "It came very swiftly, whirling the water up in a pillar about 6 or 7 yards high. As yet I could not see any pendulous cloud from whence it might come, and was in hopes it would soon lose its form. In four or five minutes' time it came within a cable's length of us, and passed away to leeward; and then I saw a long pale stream coming down to the whirling water. This stream was about the bigness of a rainbow. The upper end was vastly high, not descending from any dark cloud, and therefore the more strange to me, I never having seen the like before."

Dampier was also much out of his reckoning here, being 25 miles to the North of it, which he could not account for, except by current; perhaps he may have been set off his course by the outset of the river mentioned by D'Urville at Cape Della Torre. He subsequently found the current setting to the N.W., allowing a velocity of a mile an hour to it.†

Capt. D'Urville also states that he found the current had set him from 12 to 15 miles to the West in the course of a single night; and when a few leagues farther to the West, he estimated his drift at not less than 58 miles to the West in forty-eight hours.‡

Returning to the New Guinea coast, Capt. D'Urville describes it as being high, steep, and bordered with a very narrow fore-shore. The sea was covered with

* Remarks of M. Quoy, Voyage de *L'Astrolabe*, tome iii. p. 739.

† Dampier, vol. iii. p. 224.

‡ Voyage de *L'Astrolabe*, tome iii. pp. 556—558.

trunks of trees, and branches and other fragments of plants. At 42 miles West of Bertrand Island is a group of several islands, lying very near the coast.

Sainson Island is the easternmost of these, and is accompanied with two small islets. The two which succeed to the westward were called *Faraguet* and *Dudemaine Islands*; the two first are low and covered with large trees, amongst which some clumps of cocoa-nut trees were distinguished. *Dudemaine Island* only has a small hill on its western end, of 100 or 200 feet in height, which may be distinguished at a considerable distance among the surrounding low land.

At this part the belt of low land which lines the coast seems to form a large valley between two chains of very high mountains. This configuration would lead to the presumption that a considerable river would flow through this valley. The Islands *Sainson*, *Faraguet*, and *Dudemaine*, being united by a chain of breakers, it is probable that within this line a safe anchorage might be found, with a narrow passage in the western part. This would be a very important fact to establish, and strongly recommended to the notice of any captain who has occasion to visit this portion of New Guinea. While the *Astrolabe* was passing these islands six canoes came out from between them, but did not reach the corvette.

The coast of New Guinea, beyond these, offers nothing agreeable in its aspect. At one part it rises in deep cliffs and breakers, seeming to extend a mile off the shore. Far in the interior the summits of very high mountains may be seen. Farther on a river debouches, and the country becomes pleasant, shaded by woods and clumps of cocoa-nut trees. At 3 leagues in the interior *Mount Eyries* raised its double peak above the clouds. The *Astrolabe* was drifted within half a league of the land, and from the calm was obliged to anchor before a small cove, in which it is probable that a small vessel might find a commodious anchorage.

While lying here fifteen canoes, with outriggers, but inelegant, each carrying from three to eight natives, put off and surrounded the ship. They were armed only with bows and arrows, and upon their shooting one into the midst of the officers, a cannon fired over their heads made them fly with most ridiculous confusion. There was not the slightest doubt of their hostile intentions, and every one should, therefore, be guarded against their treachery, when off this coast.* From this incident D'Urville named the place *Attack Bay* (*Anse de l'Attaque*).

From this part of the coast the imposing summit of *Mount Bougainville* becomes visible in the West, raising its head a considerable height above the surrounding mountains.

HUMBOLDT BAY, thus named by Capt. D'Urville, lies to the West of this mountain. It was a subject of great regret to the commander that he could not, from his crippled condition, more minutely examine its interior. It penetrates deeply into the coast, particularly to the S.E., and it was presumed that in it excellent anchorages might be found. Its opening was about 4 miles in width. Of the two points which mark its entrance, that to the N.W. received the name of *Point Caillité*, and that to the S.E. *Point Bonpland*. They are both of moderate height, steep, and the first is surmounted by a small and remarkable peak.

On one side the *Cyclops Mountains*, and on the other *Mount Bougainville*,

* Voyage de *L'Astrolabe*, tome iii. pp. 558—560, 740.

stand like gigantic sentinels, pointing out the entrance to Humboldt Bay to the navigator at the distance of 20 leagues. It is probable that these two enormous mountains are the same which Bougainville named the Cyclops, but D'Urville only applied that name to the one lying West of the bay, which is the highest of the two, and has several peaks nearly of equal height.

The position of the entrance to Humboldt Bay was fixed as lat. $2^{\circ} 23' S.$, lon. $140^{\circ} 44' E.$ It is a point which merits the attention of all future navigators, and may probably become of great importance hereafter, when New Guinea shall offer any interest to commercial speculation.

The coast under the flanks of Mount Cyclops is high, steep, and covered with trees to the water's edge, without clearances or openings, which gives it a wild and desert appearance. Whales sported around the vessel, and their spouting, similar at a distance to the appearance of breakers, kept the crew in constant vigilance on this unknown coast.

To the West of Mount Cyclops the coast descends with a gentle slope to the beach, and has some landing spots, with points more or less projecting.

Matterer Bay, which lies 14 leagues westward of Humboldt Bay, is rather deeper than any preceding. It was named by D'Urville after an old ship companion, and has, doubtless, good anchorage against the greater part of the South and East winds. To the West of this inlet a low point, covered with trees, *Point Brama*, projects considerably to the N.W.; and beyond it the coast again recedes, forming Walckenaer Bay :—" At 6^h P.M., August 13, 1827," says M. D'Urville, " we found ourselves to the North of and at 10 leagues distant from a high mountain (*Mount Benoist*), situated in the interior. At 50 miles behind us the Cyclops still raised their heads above the horizon; and at the same distance to the W.S.W. a chain of high mountains already had fixed our attention. We gave them the name of Gauttier Mountains, after the great French hydrographer.

" We had some shiftings in the night, the wind varying to the South. As the coast abruptly assumed a N.W. direction, by daylight we found ourselves very near the coast. It is low on the shore, and lined with cocoa-nut and other trees. Far in the interior, several peaks were discerned, among which that of Mount Benoist was conspicuous, from its insulation and its height.

" In front of, and at 2 or 3 miles' distance from, the beach, several small islands followed each other. These received the names of *Merkus*, *Lesson*, *Renaudière*, *Mérat*, *Tastu*, and *Duperrey*. The largest, Mérat Island, is not more than 3 or 4 miles in circumference. At the distance we passed them, about 3 miles, they appeared to be covered with clumps of cocoa-nut and other trees.

" To the South of Tastu Island, and not far from the shore, a hill, surmounted by a very sharply pointed peak, was called *Mount Amable*.

" Since 2^h P.M., and at more than 10 leagues' distance, we began to perceive the Arimoa Islands. At sunset we were not more than 12 miles from them, and they then appeared as a single island, moderately elevated and well wooded. To the S.W. a part of the land seemed to be detached, and to form an island, which, from its latitude, would answer to the Moa Island of Schouten. The chain of the Gauttier Mountains here terminates on the coast. Farther to the West the

land of New Guinea is very low, and can hardly be distinguished at the distance of 4 or 5 leagues.

"For this reason, and for fear of being drifted on this low land, I decided on keeping under weigh all night. From 9^h till 11^h we were passing not more than half a league from the Arimoa Isles, and we saw that they answered completely to those that Bougainville saw, August 14, 1768. The one in the centre is only an islet, and the two others are not more than 3 or 4 miles in extent. The highest is that to the West.

"Although it was nearly calm, the current still continued to bear us to the West. When day appeared, we saw that the coast continued to run to the W.N.W., always very low, and covered with trees. Its aspect also gave rise to the conjecture that the portion we saw was only islands lying before the coast. In the interior, at a great distance, some peaks showed themselves here and there.

"Throughout the day (August 15) the breeze was so light and uncertain that we made but little progress, and frequent squalls prevented us from approaching nearer the land as we could have desired. Thus the configuration of the coast is far from being given in a particular manner. If I had had anchors to cast, I should not have hesitated to touch on some point of the coast, to gain some insight into the country and its inhabitants.

"The night was rainy, and at 6^h A.M. (16th), the sky clearing, we saw the land, like last night, at 3 or 4 leagues to the S.W., low, woody, and looking more than ever like numerous islands before the coast. Neither mountains nor any eminence whatever could be seen in the interior. It is true that the horizon was not very clear, and the haze might have obscured the distant lands.

"At 8^h, the sea in our track assuming a greenish tint, I sent a small canoe to sound in the space. No bottom was found at the depth of 45 fathoms, and I directed the corvette into the centre of this band of discoloured water. At 10³^h a fresh change of colour, much more distinct, appeared at half a cable's length before us. This time the water was quite yellow and muddy, and above it flew numerous flocks of birds, and fish were seen to leap and sport on the surface of the water. The sea seemed to break lightly along this suspected belt, and the look-out at the mast-head, and M. Guilbert himself, thought that they could see dry spots here and there.

"Although I was quite convinced that this appearance of the sea was only the effect of current, I sent M. Gressen to sound, but he found no bottom with 45 fathoms; at 11^h we were across this discoloured water, and traversing several veins of current very rapid and very turbulent. A quantity of branches of trees, of fruits, and pieces of plants, fish, and mollusca, floated on the surface. At 11³^h, in the spot where the tint was most muddy, the water we drew up was but very slightly salt. Throughout this part we had no bottom with 45 fathoms.

"This proves to me that this discoloration was but superficial, that the vessel, in her progress disturbing the water to a certain depth, left her wake of the natural blue colour. The muddy stratum seemed to have at most a depth of 2 or 3 feet. In general the lines of these currents were directed from S.E. to N.W., and the current itself followed the same direction.

"I consider, then, that it is a positive fact that these waters proceed from some considerable river, which discharges itself into the sea on this part of the coast. Bougainville observed the same thing in this part, and from it drew the same deduction. Precisely in this part of New Guinea the land forms a low point, Point D'Urville, very far advanced into the sea, and everything tends to the belief that it is formed by the outlet of a considerable stream."*

POINT D'URVILLE, according to the observations made in the *Astrolabe* by M. Jacquinot, is in lat. $1^{\circ} 24'$ S., lon. $137^{\circ} 47'$ E. The land, or, what is more likely, the islands forming this point, are certainly the same that Bougainville indicates to the N.W. of Mount Moulineaux. This was not seen from the *Astrolabe*, but doubtless the haze obscured it.

GEELWINK BAY is the very extensive bay of which Point D'Urville may be said to be the easternmost point. We shall not describe it here, but shall terminate our notice of New Guinea with Port Doreï or Dory, at the N.W. point of the bay. Off its mouth are some very large islands, Jobie Island, Mysory or Schouten Island, and others. The last named is very imperfectly known.

From Point D'Urville the coast of New Guinea turns to the S.W., preserving the same aspect, that is to say, very low, and always lined with large trees, very close to each other, which give it the appearance of an immense wall. Here and there some tufts of trees, twice as high as their neighbours, resemble rounded bastions, intended to flank this gigantic wall. Some natives came off in two canoes, with double outriggers.

Point Geelwink terminates this portion of the coast, and here, perhaps, the immense bay of the same name may be said to commence. West of this is the extensive Island of Jobie, and between its West end and Point Geelwink is a smaller one, which nearly closes the passage, and was named by D'Urville, after one of his officers, Quoy Island.

QUOY ISLAND is 8 miles long, and moderately elevated, well wooded, and pleasing in appearance. A channel of only 3 miles in breadth separates it from Point Geelwink, formed by a moderately high hill. A channel of the same breadth separates it from the West end of Jobie, which descends in a very gentle slope to the sea.

The TRAITOR'S ISLANDS lie to the North of Jobie, and off the East point of Mysory, forming the North side of the Strait of Jobie. They are small and low.

JOBIE ISLAND, which lies in the opening of Geelwink Bay, according to M. D'Urville's chart, is about 90 miles in length, lying nearly East and West. The *Astrolabe* only sailed along its northern side. The land on this coast is high, steep, and covered with woods, without any openings. High mountains form the central ridge. This aspect is preserved in the most uniform manner, and throughout its whole extent it did not appear to offer a single cove or a single creek fit to receive a large ship. But few smokes were seen, and no traces of cultivation,—signs of a scanty population. The mountains of Jobie decrease in altitude on nearing its western extreme, and its West cape is separated from Bultig by a channel of 6 miles in breadth.

* Voyage de *L'Astrolabe*, tome iii. pp. 565—568.

BULTIG or **HUMP ISLAND** is hilly, of an irregular form, and 10 or 12 miles in length, but not more than 4 miles broad. Three rounded islets, called the *Three Sisters*, lie near its East point, and before its West point are two similar islets, named by D'Urville the *Brothers*.*

LONG ISLAND was only explored on its North side. The island is tolerably large, and the land in general is but little elevated. Numerous clumps of cocoa-nut trees grow near the shore; under one of them a group of natives was seen assembled, but they did not attempt to come off.†

"It is fortunate," says M. D'Urville, "that the squalls which are felt off the North coast of New Guinea, though very violent, are of very short duration;" otherwise his navigation would have been perilous, and his experience proved, that during that season (August, 1827), at least, the bad weather was of short duration.‡

PORT DOREÏ or **DORY**.—In describing this, the best-known portion of New Guinea, we shall follow the account given in the *Voyage of the Astrolabe*, by M. D'Urville, who, having visited it at two separate intervals, is entitled to the greatest consideration.

Notwithstanding that Saavedra, Gaëtan, Schouten, Tasman, and Dampier, have by turns explored some portion or other of the North coast of New Guinea, the relation of their voyages have left us but a vague notice of the inhabitants of this great island. The English commander Forrest, who visited the harbour of Doreï in February, 1775, was the first who gave to Europe more exact notices of the customs of the Papuas, and the productions of the country. After him, Duperrey visited the same point in the month of August, 1824, and passed fifteen days at the anchorage. The officers of *La Coquille* made an exact plan of the port and its environs, and the naturalists of the expedition collected a mass of materials for science in the various natural kingdoms, and their observations may be seen in the account of the voyage of M. Duperrey.

The Harbour of Doreï is situated immediately to the South of Cape Mamori, which forms the westernmost and outer point of the entrance of the great Bay of Geelwink.

The harbour is entered by a channel 3 miles in length, formed on one side by the *Peninsula of Mamori*, and on the other by the Islands of *Mana-Souari*, and *Marmapi*, and two banks, which are awash. The harbour itself is not more than half a mile deep, and 200 yards in breadth, with a regular depth of $10\frac{1}{2}$ fathoms, sand and shells. Notwithstanding the confined extent of this basin, ships of any class may calculate on a safe anchorage, and sheltered from the winds and swell from the offing. But as it is surrounded by deep forests, and at the bottom of the harbour there are many mud-banks, often dry, a long stay here would doubtless be unhealthy for Europeans, especially in the rainy season.

All the environs of the harbour, properly so called, are occupied by forests in a state of nature, standing on a coralline soil, which rises with a very gentle slope. But the beds of the torrents are bestrewed with numerous boulders of a granitic

* *Voyage de L'Astrolabe*, tome iii. p. 573.

† *Ibid.* tome iii. p. 572.

‡ *Ibid.* tome iii. p. 574.

nature, probably brought down from a higher level. The whole of the mountains of Arfak appear to be of primitive formation, according to the geologists.

The cultivated lands do not commence but at the villages, and extend all along the bank of the North channel. The land is of so rich a nature that it is sufficient to stir it and pull up the weeds to obtain most abundant crops. But the Papuas are as indolent as they are wanting in intelligence in the art of cultivation, and the vegetables for food are often choked by parasitic plants. The plantations of the *arum* alone seemed to be a little better attended to.

The inhabitants of Doreï are distributed in four villages on the borders of the sea; two are on the North side of the harbour, and the two others on the Islands Mana-Souari and Masmapi. Each village contains from eight to fifteen houses, built on piles; but each house contains a range of distinct cells or apartments, and holds several families. Some of these houses contain a double range of these cells, separated by a corridor, which extends from one end to the other. These edifices, entirely constructed of wood, rudely shaped, are open to the weather in every part, and frequently shake under the feet of the visitor. The total population of Doreï cannot exceed 1,500 souls.

All the inhabitants of Doreï recognise the sovereignty of the sultan of Tidore; and, notwithstanding the distance, a vessel is despatched every year to carry to the sultan the tribute and homage of his Doreïan subjects. These tributes consist of slaves of both sexes, tortoise-shell, birds of paradise, wax, &c.

“The result of the observations of M. Jacquinot has placed the observatory at Doreï in lat. 0° 51' 43" S., lon. 133° 59' 52" E. Our longitude differs 6' from that of M. Duperrey, and this difference partly arises from that officer having adopted a greater longitude for the westernmost of the Mispalu Islands than we have done, and also that he made a greater difference between the longitude of Mispalu and that of Doreï than we did. More lengthened and rigorous observations would reconcile these slight differences.”*

CHAPTER XXXI.

ISLANDS BETWEEN THE EQUATOR AND LAT. 10° N.

FOLLOWING the plan adopted in the preceding pages, we commence from the coast of America, and include in this chapter the group of islands, the Gilbert Archipelago, which lie on the Equator, and the Marshall Archipelago to the North of it. The Caroline Archipelago, lying within the same belt of latitude, will form the ensuing chapter.

* Voyage de *L'Astrolabe*, tome iii. p. 600.

MALPELO ISLAND, in lat. $4^{\circ} 0' N.$, lon. $81^{\circ} 32' W.$, is a barren, high, perpendicular rock, which may be seen in clear weather at the distance of 20 leagues, the summit being 1,200 feet above the sea level. A small quantity of green moss, and a few dwarf bushes, which grow in its cracks and gullies, afford the only verdure that it possesses. It is surrounded with islets, and the whole may extend about 9 or 10 miles from North to South. The centre of this island bears a resemblance, in several points of view, to the crown of a head, and its being barren accounts naturally enough for the name (bald head) which the Spaniards have bestowed on it. It is surrounded, as it were, by a strong current, having much the appearance of breakers, which setting into the gulf, and being accompanied by light winds, with thick and hazy weather, Colnett did not think it deserving of any further attention. The current was found to set N.E. by E. $2\frac{1}{2}$ miles an hour.* Another statement† is made that they run violently to the southward and westward near it, a difference possibly owing to the different seasons they have been observed in. Colnett's was in July, 1793. The rock itself has 40 fathoms alongside of it, and 110 fathoms at a quarter of a mile distant.

RIVADENEYRA SHOAL.—"Being on board the steamer *Peru*, abreast of Puná, October 22, 1842, and hearing that there was a terrible yellow fever raging at Guayaquil, the steamer put back, and I was placed on board a small schooner going to Realejo. On the 28th, in the middle of the day, the sea calm, we had caught a large turtle, when I observed at a few fathoms off a slight swell on the sea; we took the boat and went to it, when we sounded, and to our astonishment found only $16\frac{1}{2}$ feet (French ?) of water; in the centre of this circular spot was only 10 feet depth; we then found 14, 16, 27, 56 feet, and then no bottom. By our very imperfect instruments we made it to be in lat. $4^{\circ} 15' N.$, lon. ($87^{\circ} 30'$) $85^{\circ} 10' W.$ of Greenwich; but this we considered nearly correct, as we hastened on to Realejo."‡

COCOS ISLAND.—The discovery of this island is involved in obscurity. It is mentioned as being well known by early navigators, Lionel Wafer, Dampier, &c. Its more exact position and character appear to have been first ascertained by the Spanish exploring ships, the *Descubierta* and *Atrevida*, in 1791. It was then visited, and, it is stated, surveyed, by Capt. Colnett in 1793. In 1795 it was visited by Vancouver, who also examined it. There are some singular discrepancies in the accounts given by these different visitors, more particularly in those of the two last named. Vancouver states it to be $4\frac{1}{2}$ miles in length N.E. and S.W., while Colnett states it to be 12 miles; and the respective plans given also coincide with the descriptions. These discrepancies were decided in Vancouver's favour by Sir Edward Belcher in 1838. He places the observatory at the head of Chatham Bay, at the N.E. part of the island, in lat. $5^{\circ} 32' 57'' N.$, lon. $86^{\circ} 58' 22'' W.$; var. $8^{\circ} 24' E.$

* Nautical Magazine, September, 1837, p. 611.

† Colnett, p. 66.

‡ Substance of an extract of a letter from M. Rivadeneira to the Société de Géographie de Paris, Bulletin, &c., tome ix. 1848, pp. 125—127, 323.

The island, according to Mr. Whidbey's account, is about 4 leagues in circuit, with several detached rocks and islets scattered around its shores. Off the S.W. point they extend to the greatest distance, nearly 2 miles, and would be dangerous if they were not sufficiently high to be seen and avoided. The tops of these surrounding islands are generally covered with trees; the lower parts consist of a belt of white barren rock to the water's edge.

The island itself is very high, sufficiently so to be seen at more than 20 leagues distant; and Vancouver says that he lost sight of it at 46 miles W.N.W., not from sinking below the horizon, but from being obscured by haze. The West side is the highest, showing in the form of a round hill, descending the northern extremity, which appears like a detached islet when bearing to the eastward. From this quarter the southern part appears to rise abruptly from the sea, in steep rugged cliffs, to a considerable height. The northern side is indented into small bays, with rocks and islets lying near them. The shores are chiefly composed of broken cliffy perpendicular precipices, beyond which the surface rises unevenly to the summit of the island, the whole composed of one rude connected thicket of small trees, near the shore; but on the more elevated and interior parts of the island are many large spreading trees, among which are cocoa-nut trees, but not in such abundance as to distinguish the island.

Colnett and Wafer speak in high terms of the beautiful appearance of the island. Colnett was here in July, 1793. He says it is Otaheite on a small scale, but without the advantage of its climate or hospitality of its inhabitants. Vancouver, who came here in January, 1795, gives a different opinion:—"This island cannot be considered as having a pleasant appearance in any one point of view; for although its inland surface is much diversified by hills and valleys, yet the only low land of any extent that we were certain it possesses is in the bottom of the two bays (on the N.E. side), each of which form the extremity of one of these valleys, bounded by craggy precipices, from the foot of which extends a narrow slip of low flat land that terminates in a beach at the water side, resembling more the dreary prospect exhibited at the heads of the several branches of sea we had so recently explored on the N.W. coast of America, than anything else I could compare them to."

The one great advantage which Cocos Island offers, is the abundance of fresh water. Apparently it is quite pure, and is very easily to be procured at those points to which vessels can resort. Fish are abundant around the shores, but would not take bait; sharks in large shoals, and very voracious, are among the number. Fowl of the oceanic kind visit the island, and afford tolerable food. The cocoa-nuts, also, have been of great service to earlier navigators.* All the trees for fuel have been cut, and there are no cocoa-nut trees remaining which are accessible. Pigs are abundant.

Chatham Bay is the easternmost anchorage on the island. Vancouver moored here in 33 fathoms, sand and gravel, good holding ground and free from rocks. The East point of the bay, which is a small conical islet close to the N.E. extreme

* Colnett states that his men drank an excessive quantity of the milk, which did not intoxicate, but so benumbed them that they were unable to move without assistance; this continued for four or five days.—*Voyage to the South Seas*, pp. 67-8.

of the island, bears N. 51° E., half a mile distant; West point of the bay, S. 75° W.; a steep rocky islet lying off it from S. 87° W. to N. 66° N.; and the watering place at the mouth of a very fine stream emptying itself over a sandy beach, S. 13° W., about three-quarters of a mile distant. Outside this the water deepens almost immediately. This bay is quite open to the North, and Colnett states that though he found the prevalent winds to be from South and West, he had it frequently strong from N.E. and North.

Wafer's Bay, as it is named in Colnett's plan, is to the westward of the former, and one mile distant from the N.E. point; it may be easily known by a small rugged, barren rock, about the size of a large boat, bearing West of the body of the bay about 5 or 6 miles. The bay also lies East and West, but is not adapted for vessels of above 200 tons; it is nearly sheltered from all winds. Vancouver says it is certainly not so eligible a situation for procuring the good things the island affords as the bay to the eastward, although a more copious stream of water flows into it.

The *climate* of the island is humid. Vancouver considered it (January) temperate and salubrious, but had heavy rains. Colnett, who stayed longer, experienced almost constant and very heavy rain. Flies, too, were very abundant and annoying.

The *tide* is an important object in anchoring here. The time of high water is about $2^h 10'$, rising and falling from 16 to 18 feet. The ebb sets to the East at the rate of 4 or 5 knots. The flood, which is weaker, runs to the West. They are uninfluenced by currents. The current around is strong and irregular, but generally setting to the north-eastward at the rate of 2 knots.*

DUNCAN ISLAND, PASSION ISLAND, GALLEGU ISLAND(?)—To the West of the Galapagos some islands have been announced under the above names. The particulars and positions are extremely doubtful, and whether any or all of them exist, or whether they are all identical, is equally open to question. The first was discovered in 1787, it is said, by Capt. Duncan, in a merchant vessel. He says the island is small and rocky, in lat. 6° N., lon. 35° W. of Valparaiso, or 106° W. of Greenwich. Admiral Krusenstern says it is probably the same island discovered by Capt. Dubocage, in *La Découverte*, of Havre, at the commencement of the last century, on Good Friday, and hence he named it L'Ile de la Passion. This circumstance is noticed by Le Barbinais, who made a voyage to the South Seas in 1714. On Espinosa's chart it is placed in lat. $16^{\circ} 54'$ N., lon. 109° W. These three sites vary so much from each other that Admiral Krusenstern was induced to erase all but the first, which must also be regarded as very deficient in authenticity.

WALKER'S ISLANDS.—A wide extent of ocean intervenes in this belt of latitude between the positions of the foregoing doubtful islands and that of the isolated cluster which are named as above. From a notice preserved by Mr.

* See Dampier, vol. i. p. 111; *Viage de la Descubierta et Atrevida*, 1791; Vancouver's *Voyage Round the World*, vol. iii. pp. 364—367; Colnett's *Voyage to the South Seas*, pp. 66—74; Parry's *Ethiopic Memoir*, 1824; Morrell's *Voyages*, p. 91; *United Service Journal*, vol. v. part ii. p. 732.

Purdy, they were discovered by Capt. Walker, in 1814, and consist of a group of small, low, and well-wooded islands. Their lat. is $3^{\circ} 34' N.$, lon. $149^{\circ} 15' W.$ On some charts they are marked as *Low Woody Islands*.*

CHRISTMAS ISLAND, a coral lagoon island, was discovered by Capt. Cook, in the *Resolution* and *Discovery*, on Wednesday, December 24th, 1777. He remained here till January 2nd ensuing, and observed an eclipse of the sun, and from the season gave it the name. It is, like all other islands of the same nature, a belt of low land, enclosing a lagoon, which, however, in this case is very shallow. The entrance into it is on the N.W. side, and was divided into two channels, fit only for boats, by a small island, on which Cook landed his instruments, and planted some cocoa-nuts, yams, and melon seeds. Here he also left a memorial of his visit.

The low land is covered with stunted bushes, and a few cocoa-nut and palm trees here and there. From the S.E. to the S.W. points of the island the coast runs N.W. by W. $\frac{3}{4}$ W. 25.8 miles. A deep bay, however, runs to the northward from a point of land about $13\frac{1}{2}$ miles from the S.E. point, near which are two conspicuous cocoa-nut trees, bearing about N.E. by E., *true*, when in one with the point. Close to the S.W. point are two or three groves of cocoa-nut trees (which from the sea appear as one), planted by Capt. Cook on its discovery. From the S.W. point the land trends N.E., *true*, $4\frac{1}{2}$ miles, forming a small bay, in the N.E. part of which is anchorage, half or three-quarters of a mile from the shore, sand and coral, 9, 8, 7, and 6 fathoms. No turtle were seen by Capt. Scott, September, 1840, although Cook found an abundance. From the N.E. point of this bay the land appears to run away East into a narrow bight, and then trends to the W.N.W. in a slip, terminating in the N.W. point, which bears nearly North 7 miles from the S.W. point.†

The island does not afford any fresh water. Cook's party dug without success in several parts of it, consequently it is uninhabited, except by flocks of sea-birds, who here lay their eggs under the low trees in parts of the island. They also caught abundance of fish. Though a vessel on its shore may be seen from most parts of it, it was still large enough for some of Cook's sailors to lose themselves on it, and to be recovered only after great privations.

Capt. Scott, R.N., confirms Cook's position of the island. Cook places the small islet in lat. $1^{\circ} 59' N.$, lon. $157^{\circ} 30' W.$; variation, $6^{\circ} 22\frac{1}{2}' E.$ (1778).‡

According to Capt. Scott, its S.E. point is in lat. $1^{\circ} 40' 34" N.$, lon. $157^{\circ} 13' 53"$; S.W. point, lat. $1^{\circ} 51' 54" N.$, lon. $157^{\circ} 38' 57" W.$; N.W. point, lat. $1^{\circ} 59' 30"$, lon. $157^{\circ} 30' 3" W.$; S.E. point, meridian distance from Resolution Bay, Marquesas, $18^{\circ} 2' 28" W.$

WASHINGTON ISLAND was discovered by Capt. Edmund Fanning, on board the American ship *Betsy*, in 1798, the day after he had discovered the island bearing his name to the S.E. It has also been called New York Island

* Krusenstern's Supplement, p. 115.

† Capt. Scott, R.N., H.M.S. *Samarang*, 1840.

‡ See Cook's Third Voyage, vol. II. pp. 180—189.

on the charts. According to Capt. Wilkes, it is in lat. $4^{\circ} 41' 35''$ N., lon. $160^{\circ} 15' 37''$ W., very nearly the position originally assigned. It is $3\frac{1}{2}$ miles long by $1\frac{1}{2}$ miles broad, and is entirely covered with cocoa-nut and other trees, exhibiting a most luxuriant growth. There is a reef off its eastern point, which extends for half a mile. At the western end a coral ledge extends 2 miles in a N.W. by W. direction, on which the water appears much discoloured, but the sea was not seen to break upon it, except close to the point of the island. It is elevated about 10 feet above the sea. The surf is very heavy, and the island affords no anchorage.

FANNING'S ISLAND, as before stated, bears the name of its discoverer. Its position, according to Capt. Tromelin, is in lat. $3^{\circ} 53'$ N., lon. $158^{\circ} 23'$ W.; but as the original position of Washington Island is nearly correct, perhaps the mean of the three observations by its discoverer may also be so—lat. $3^{\circ} 48'$ N., lon. $158^{\circ} 47'$.

According to the account of the voyage of Capt. Fanning, published in 1834, the group consists of three islands, of which two are 9 miles long, and the third 6 miles. They were inhabited, and were lower than Washington Island, and a coral ledge extends $1\frac{1}{2}$ miles along the western side of the island, under the shelter of which he thought that a vessel might water.

Capt. Legoarant de Tromelin visited them in 1828, in command of the royal corvette *La Bayonnaise*. The ship watered here, and a very detailed description is given of the islands, which, however, does not at all accord with that of Mr. Fanning. According to Capt. Tromelin, there is but a single island of about 5 miles in diameter, of nearly a round form, little elevated above the sea, and nearly entirely covered with cocoa-nut trees. The island encircles a lagoon, 3 miles broad, communicating with the sea by a passage 100 to 150 yards wide; but the interior of the lagoon is obstructed by coral banks to the surface of the water, leaving only a small space clear near the entrance. A large quantity of fish of various sorts is found in the lagoon. The island is abundantly provided with excellent water, and firewood may be also procured.

It is not improbable but that this may be the American Isles, stated by Kotzebue to have been discovered by Capt. Mather, of the *American*, in 1814, 28' more to the West. It is singular that Capt. Hudson, of the U.S. Exploring vessel *Peacock*, should be satisfied that there is no other island than Washington Island hereabouts. He states that he diligently sought for eight days the positions where five islands have been reported to exist, but no land was seen. Capt. Fanning's discoveries appear to be quite authentic, and there are the Samarang Isles to the westward, discovered in 1840. Perhaps the strong and various currents hereabouts may have led to some confusion.

PALMYRA ISLAND was discovered, November 7, 1802, by an American vessel of the name, during her passage from Juan Fernandez to Manila. According to the description of her commander, Capt. Sawle, it is uninhabited, flat, and has a lagoon in its centre 7 miles long, in which the tide regularly ebbs and flows. The island is 14 miles in extent from East to West, and about

half that in breadth. The *Palmyra* anchored on the N.W. side of the island in 20 fathoms, at three-quarters of a mile off shore.* Abundance of turtle were found, but no fresh water. Lat. $5^{\circ} 50' N.$, lon. $162^{\circ} 23' W.$

The SAMARANG ISLES were discovered by Capt. Scott, in H.M.S. *Samarang*, September 15th, 1840.† They are a group of about fourteen or sixteen, forming a belt round an apparently shallow lagoon, and are covered with flourishing cocoa-nut and palm trees to the water's edge. In the centre of the eastern reef is a small dry sand-bank; the reef itself extends from the eastern islet nearly East, about 2 miles, over which the sea breaks heavily. Another reef runs out from the western islet, about a mile to the westward; what distance they run in that direction was not ascertained, but at 3 miles from the breakers on the western reef soundings were obtained in 9, 8, and 7 fathoms, at which time the N.W. breakers were discovered from the foreyard. By the angles that were taken they stretch out full 9 or 10 miles to the N.W. from the western islet; the northern edge of the N.W. reef appeared from the mast-head to run away about S.E. by E. till it joined the eastern one. Broken water was observed here and there along the whole line, with evident shoal water between it and the coral reef before mentioned.

With the strong currents experienced by the *Samarang* in this neighbourhood, a more dangerous spot to those navigating these seas, unacquainted with its existence, can scarcely exist than this group of coralline islets, with their extensive reefs. Had it not providentially fallen calm during the night, the *Samarang* must inevitably have been lost, with the probability of every soul on board perishing, as her course would have taken directly on to the reef.‡

The eastern breakers are in lat. $4^{\circ} 56' 15'' N.$, lon. $162^{\circ} 17' 35''$; and the West islet is in lat. $4^{\circ} 55' 9''$, lon. $162^{\circ} 22' 20''$.

GILBERT ARCHIPELAGO.

In this group there is considerable confusion of names. This arises from the fact of their disjointed discovery, the name applied to one portion of an island not being extended to the whole. In the subsequent descriptions we have endeavoured to reconcile these discrepancies, which will best explain themselves.

The first island discovered was the easternmost, Byron Island, so named from the commander, who saw it June 3, 1765. The next were the northern groups discovered by the ships *Scarborough* and *Charlotte*, commanded by Capts. Marshall and Gilbert. There is a loose account of this discovery given in Governor Phillip's Voyage, in 1788.§ The next authority in order is a chart contained in Dalrymple's Collection, drawn by Roger Simpson and George Bass, officers of the *Nautilus*, under Capt. Bishop. In the Table of Positions, by John Purdy, p. 153, is an account of some of the islands seen by the brig *Elizabeth*, about 1809. In 1824 Capt. Duperrey visited and explored many of them; but by far the most

* Hunter's Historical Journal, p. 247.

† They may be the same as Prospect Island.—*Krusenstern's Supplement*, p. 163.

‡ Nautical Magazine, September, 1841, pp. 190-1.

§ Voyage of Governor Phillip to Botany Bay. London, 1780.

complete account of them is given in the account of the United States' Exploring Expedition. The ship *Peacock*, and her tender *Flying Fish*, surveyed the greater part of them. We may therefore suppose that they are correctly laid down on the chart.

The name *Gilbert Archipelago* was given to the group by Admiral Krusenstern,* after the commander of the *Charlotte*, one of the first explorers; the other commander's name being given to the group to the northward. Krusenstern separates them into three groups, the *Kingsmill Islands*, consisting of Bishop or Drummond Island and their subordinates; the *Simpson Group*, Woodlee, Henderville, and Hopper, from the before-mentioned officers of the *Nautilus*; and the *Scarborough Range*, Marshall, Knox, Matthew Islands, &c., from Capt. Gibbon's vessel. All these names seem to be very appropriate, and have been for many years acknowledged; we therefore follow them. On the other hand, in the American work they are all given under the collective title of the *Kingsmill Islands*; the name being only that of a small portion. From the account of the Expedition we derive the greater portion of the following.

According to the information collected by Capt. Hudson and Mr. Hale and furnished to Commodore Wilkes, the group consists of fifteen islands, ten of which were visited, the rest assumed from native information. The highest land of the group is not more than 20 feet above the sea, and they are all of coral formation, having a general resemblance to the usual form of those islands. But it was found that, unlike those, many of the islands of this group afforded anchorage on their lee side on sand-banks; and in some of them the lee or western reef is wanting; this would form a distinctive character, and affords additional weight to the fact that the islands are fast wearing away by the action of the sea on them during westerly gales. The compact coral shelf is found at the depth of 12 feet beneath the surface. Another evidence of their decrease is, that in all cases where the island is at all exposed, it has become, as would be in such a case, a string of detached islets.

Their soil, which is but a few inches in depth, is of coral sand and vegetable mould, below which coral sand is to be found, and to this depth the wells and taro patches extend. The rain water percolates thus far, and meets the coral rock. Pieces of pumice are found, supposed to have been drifted on to it. The cultivation is chiefly cocoa-nut and pandanus, the chief articles of food. A species of taro (*Arum cordifolium*) is also grown with great care. On Makin or Pitt Island it is said that there is a trench, 10 feet wide and not less than 7 miles long, dug around the lagoon, for the cultivation of this taro.

In the Narrative of the United States' Expedition there is a long and interesting account of the natives and their customs. We cannot dwell further on this here. Some notices of them are appended to the accounts of the islands. Their origin from their own traditions is more probable than most Polynesian nations. They state that the first inhabitants arrived in two canoes from Barnes or Baneba, an island to the south-westward, having escaped during a civil war. After they had settled, two other canoes arrived from an island, Amoi, to the

* Memoir, vol. ii. p. 377.

south-eastward : these last were lighter in colour, better looking than the former, and spoke a different language. The first brought the taro with them ; the second the bread-fruit (which are now only to be found on the northern). The cocoa-nut and pandanus were found growing. For one or two generations they went on amicably, but then began to quarrel about the Amoi women, which ended in that part of the male community being killed, the Baneba men taking the Amoi women. From these sources the islanders are derived. Amoi may be the Samoan group, Baneba may be in the Caroline group (Pouynipète or Bonabè), but it is difficult to decide.

The population of the group was assumed to be about 60,000. At Drummond's Island they were estimated at 10,000, which was the most populous. If the dry land only is taken, this will not be more than 150 square miles, which gives between 400 and 500 to the square mile. But the whole area from whence they can derive support, the lagoon and sea around, will increase this to 500 square miles, giving 120 inhabitants to the square mile for support. They are thus immensely populous.

The food of these people, besides the plants mentioned, consists of all kinds of fish, from the whale to the sea-slug. Great numbers of fish are taken in weirs on the coral flats. Turtle are taken in the season on the beaches ; and shell-fish, with the sea-slug or biche-de-mar, are obtained by diving. Whales are said to have been formerly much more numerous than now. They then sometimes got aground and were taken. Now a carcass occasionally drifts on shore.

They have not been much visited, and the few strangers who have communicated with them have wrought but little change. The southern islands have been most visited, from their being near to the whaling grounds. There is nothing to induce trading vessels to come here : they possess but little in the way of refreshment, and there is neither wood nor water in any quantity. They possess many good harbours, a rare advantage in low coral islands.

The CLIMATE of these islands is equable, and though of high temperature, it is found to be less oppressive than in most tropical countries. For the most part constant breezes prevail, and frequent rain falls, which moderates the great heat, and, at the same time, confers fertility on the soil. From October to April, the time of the *Peacock's* visit, is the winter, and is especially distinguished by the frequency of rains. Variable winds from the northward and westward prevail at this season, and they have violent gales from the S.W. ; these, according to Kirby (who was taken off the islands), are typhoon-like. The natives plant stakes to prop up their houses, and tie them down, to prevent them from being blown away. These storms last three or four days, veering gradually round to the North. The leeward sides of the islands receive most damage, and both land and trees are swept away. Kirby stated that, during his residence, the lee side of Kuria had worn away. In these gales the trunks of large trees are thrown on the West side of the island, together with large lumps of resin, similar to that found on the soil at New Zealand, which the natives use to scent their oils with : these trees, sometimes 2 feet in diameter, were thought to be of the pine species ; many stones are found in their roots, from 8 to 10 inches in diameter ; these are a fine basalt, and the natives use them for various purposes.

From May till September the weather is fine, with clear skies, and only occasional showers; and during this time the wind blows constantly from the eastward. This is the season in which the natives make their voyages; they never venture abroad in the winter months, even from island to island, being well aware of the danger of so doing.

Earthquakes are occasionally experienced in these islands. Kirby stated that during the three years he was on Kuria, or Woodle's Island, he had felt ten or twelve, sufficiently severe to shake down a house: the natives exhibit no fear on account of them. The direction of the oscillations seems to be from the S.W.*

The following account begins with the southernmost of the archipelago, and proceeds northward.

ARURAI, ARORE,† or HURD'S ISLAND, is the southernmost of the group. It was discovered in the *Elizabeth*, prior to 1810, and was then named *Hope Island*: "but," says Mr. Purdy, "there being another Hope Island at about 14° distant to the northward of the equator, I have substituted Hurd's Island on the chart, from respect to Capt. Hurd, of the navy, hydrographer to the Admiralty."‡

The following recent account of it is given by M. Dutaillis:—It is low and well wooded. It perhaps may be seen at 10 miles off. Its length is 6 or 7 miles, and its breadth 1 or 1½ miles. It cannot be reached except on the West. The South point is terminated by a breaker which extends to 3 cables' length.

The sea breaks heavily on the shore to the East. At the North point of the island there is a bank of sand, with some rocks interspersed, on which there are but 3½ fathoms. It is all the more dangerous because the sea does not always break on it. Its extent is about 4 miles, and its direction is determined by the angles comprised between N.N.E. and E.N.E., of which the North point is the summit.

The West point of this island forms an extensive bay, where the whalers anchor. Fish, poultry, cocoa-nuts, &c., are easily procured in exchange for tobacco.

The island reckons 400 to 500 inhabitants. They are completely naked. They are in general attacked with a disease which gives the skin an appearance like the scales of a fish. Their canoes, formed from a vast number of pieces, are clinker built, and are most graceful in form.

A custom has been introduced here, which may, perhaps, be extended, and is not without utility. Each ship, on its quitting, leaves a note, specifying the name of the vessel, the port of its equipment, the quantity of oil made, &c. It is from this series of papers in the possession of the Indians, and carefully preserved by them, and also from a young American now established among them, but left here sick, that the foregoing particulars have been procured.

South point, lat. 2° 40' 54" S., lon. 177° 1' 13"; North point, lat. 2° 37' 24" S., lon. 176° 56' 57" E.; variation, 9° 2' E.§ These results are nearly identical with those assumed by Mr. Purdy.

BYRON ISLAND (or *Nukunau*) was discovered by Commodore Byron, July 2, 1765. He describes it as a low, flat island, of a most delightful appear-

* United States' Exploring Expedition, vol. v. p. 105.

† It is on the four-sheet charts of M. Vincendon-Dumoulin, under the name of *Ereraï*.

‡ Table of Positions, &c., p. 153.

§ M. Dutaillis, *Ann. Hydr.*, vol. i. p. 1534.

ance, and full of wood, among which the cocoa-nut was very conspicuous: he saw, however, to his great regret, much foul ground about it, upon which the sea broke with a dreadful surf. He sailed along the S.W. side of it, and estimated it to be 4 leagues in length. It was very populous, but they could find no landing place. The natives came off in great numbers: they were cheerful and friendly. The position is given as lat. $1^{\circ} 18' S.$, lon. $177^{\circ} 45' E.$; variation, 1 point E.*

ONOUTOU or ROTCH ISLAND, MARIA ISLAND (or *Peru*), and ELIZA ISLAND, are inserted on Arrowsmith's chart from the information of Capt. Clerk, commanding the ship *John Palmer*. Krusenstern places them among the doubtful islands; but in Capt. Wilkes's Narrative the first is said to exist, and that the Francis Islands are called Peru. In the charts Maria Island is called Peroat. Their positions, as given in the tables, must therefore be open to considerable doubt as to accuracy. In Capt. Wilkes's work there is a portrait of a native girl from Peru or Francis Island.†

The only other island to be noticed in this portion is TAMANA or PHŒBE ISLAND. In Mr. Reynolds's Memoir, Phœbe Island is placed in lat. $0^{\circ} 15' N.$, lon. $176^{\circ} 45' E.$; but Admiral Krusenstern places it among his list of doubtful islands.‡ In Capt. Wilkes's Narrative, drawn up from native and other information, it is known to the natives by the name of Tamana.§

TAPUTEUEA or BISHOP or DRUMMOND ISLAND.—This extensive island, or group of islets, had the second of the foregoing names applied to it by Admiral Krusenstern, from the commander of the vessel, the *Nautilus*, who is presumed to have discovered it. In the chart drawn up from that voyage the only island named is *Drummond Island*; it is there shown as 26 miles, the whole length lined with rocks and reefs, outside of which the *Nautilus* anchored in 18 fathoms. At 5 miles to the West of this reef is another, shown separately on the chart under the name of the *Nautilus Shoal*, near which the vessel passed. Both of these were examined by Capt. Duperrey, in 1824; but the fullest account is that given in Capt. Wilkes's Narrative.

It was made by the U.S. Exploring ships *Peacock* and *Flying Fish*, April 3, 1841. They here encountered the regular N.E. trades. It is situated in lat. $1^{\circ} 20' S.$, lon. $174^{\circ} 57' E.$ It is of coral formation, 30 miles long in a N.W. and S.E. direction, and varies in width from half to three-quarters of a mile. This, however, only includes the high portions, or that which is above the ocean level a few feet. It is thinly covered with cocoa-nut and pandanus trees, and not a patch of grass is to be seen, or any sort of shrubbery or undergrowth. To the leeward, or on its West side, the reefs and sand-banks extend off some distance, gradually increasing from the N.W. point to the S.E., where they are as much as $6\frac{1}{2}$ miles in width. This reef is interrupted in many places, and there is good anchorage off the town of *Utiroa*, towards the N.W. end, near a small sand-bank, which is usually bare. The whole shore of the island, as the *Peacock* approached it, appeared covered with houses, presenting to the view

* Byron's Voyage, Hawkesworth's Collection, vol. i. pp. 113-4.

† Narrative of the United States' Exploring Expedition, vol. v. p. 67.

‡ Supplement, p. 162.

§ Narrative of the United States' Exploring Expedition, vol. v. p. 80.

one continuous village. At intervals of a mile there were buildings of huge proportions, far exceeding in size any they had before met with.

The natives of this island are totally different to those on the islands to the South. They are middle sized, slender, and well proportioned; their colour a shade or two darker than that of the Tahitians, and they exhibited a greater variety of face and features, with black glossy hair, finer than in other races. Their features are small, but high and well marked, their cheek-bones projecting, and are the only natives in the Pacific that have the defect of decayed teeth. Altogether they were thought to resemble the Malays. The majority of them go entirely naked, except a conical covering for the head of plaited and bleached pandanus leaf. They exhibited many bodily traces of their warlike dispositions in their numerous scars and wounds. In order to guard against the destructive effect of their formidable shark's-teeth swords and spears, they have invented an effective kind of armour, a sort of cuirass of plaited cocoa-nut fibres, as solid and compact as a board, and half an inch thick. This rises, like a high-backed chair, 3 or 4 inches above the head. They also draw on more flexible coverings for the legs and arms. Their head-dress is still more singular, the skin of a porcupine fish cut open at the mouth to fit the head. They were extravagantly fond of tobacco; their chief desire was to obtain it, and in return they always gave something equivalent. Their canoes were different to the other islanders, averaging 12 or 15 feet long, 2 to 3 feet deep, and from 15 inches to 2 feet wide; they are well modelled, built in frames, and have much sheer; they are formed of cocoa-nut-tree boards, sewn neatly together, and use an outrigger, though much smaller than usual; one of the sides is nearly flat, and in this respect resemble the Ladrone proa figured in Anson's voyages.

When the party visited the island, of which a lengthened account is given in Capt. Wilkes's Narrative, they were much incommoded by the insolence and rudeness of the people, and one of the men having been decoyed away or murdered, the ship's party made an assault on the town of Utiroa, which was burnt.

There are fourteen towns on the island, which, basing the calculation for their population on that of Utiroa, which was estimated at from 1,000 to 1,200, it would give this small strip of land as great, if not a greater, number of inhabitants to the square mile, than any portion of the globe that relies upon its own resources for subsistence.

The four northern towns are apparently united, and hostile to the southern ones. Between Eta and Utiroa there is a considerable space uninhabited, which appears to form a line of separation between their territories.

Capt. Hudson found a bank, on which he anchored, in 15 fathoms water, at the distance of 4 miles from the island. Opposite to the town of Utiroa is a long flat, over which, at ebb tide, a boat will not float; and as it was at low water when they landed, it became necessary to walk through the shallow to the beach, which was nearly a quarter of a mile distant.

No land-birds were seen but curlews, golden plovers, turnstones, noddies, and white terns; many whales' bones were strewn over the beach. This was the first place where they had observed the shells of the *Tridachna gigas*: they were of enormous size; the natives used them for troughs for many purposes around their houses.

During the day of the 9th of April the thermometer stood in the sun at 159° of Fahrenheit. On the night of the 14th they were set strongly by the current to the westward, and by morning were 15 miles to leeward, and out of sight of the island.

The character of the islanders, says Capt. Hudson, is the most savage of any that we met with; their ferocity led to the belief that they were cannibals, although no positive proofs were seen of it. They are under no control whatever, and possess little of the characteristic hospitality usually found in savage nations. It was observed, also, that their treatment of each other exhibited a great want of feeling, and, in many instances, passions and propensities indicative of the lowest state of barbarism. Their young girls, many of whom were quite pretty, and all in a state of nudity, were offered to be disposed of, by their fathers or brothers, alongside the ship, openly, and without concealment; and to drive a bargain for them was one of the principal objects of their visits to the ship.

There is neither wood nor water to be obtained at this island, and no inducement to visit it, except to trade for a few cocoa-nuts and curiosities.

Good whaling ground exists in the vicinity, and the American whalers are in the habit of cruising in this neighbourhood. Those who visit these wretches ought to keep a constant guard against treachery, for their numbers are large, and they are prone to mischief. All intercourse with them should, therefore, be conducted with great caution, especially in ships weakly manned.*

NANOUTI or SYDENHAM ISLAND is one of the early discoveries in the group. In the chart drawn up by Roger Simpson and George Bass, of the ship *Nautilus*, given in Dalrymple's Collection, it is or was composed of *Dog Island* and five smaller islands, separated by a considerable reef. On the original chart above mentioned, the S.W. of these islets is called *Two-tree Island*, and the West point of *Dog Island* is called Cape Morai. It was examined by Capt. Duperrey in his voyage of discovery in 1824. In the Table of Positions by Mr. Purdy there is an account of the discovery by the brig *Elizabeth* of *Blaney's Island*, "long, low, and abundantly supplied with cocoa-nut trees" (*vide* p. 154). All these observations, however, give place to those of the United States' Exploring Expedition, in which, however, the error is committed of stating it to be the same as the Bishop's Island "of the charts."

It lies in lat. 0° 36' S., lon. 174° 24' E. It is of coral formation, and a mere ledge of land like Drummond Island, with a lagoon, reef, and a bank on its lee or S.W. side. By Capt. Hudson's survey it is 19 miles long, trending N.W. and S.E., and its width, including lagoon and reef, 8½ miles. On the S.W. and N.W. portions of it there is a coral bank, from 1 to 1½ miles beyond the reef, on which there are 10 fathoms water. At the distance of 4 miles from the N.W. end of the island they found soundings in 265 fathoms.

The island is partially covered with cocoa-nut, pandanus, and other trees; and the islets of which it is formed are nearly continuous, connected by the usual coral reef. They had no communication with the natives of Nanouti. A daily intercourse is kept up between it and the Drummond islanders. It was thought

* Narrative of the United States' Exploring Expedition, vol. v. pp. 45—62.

there was no difference in their characters. The distance between them is but 15 miles.*

NANOUKI or HENDERVILLE ISLAND was discovered by Capts. Marshall and Gilbert, and was also examined by Capt. Duperrey, in 1824. It was surveyed by the United States' Expedition.

It is in lat. $0^{\circ} 11' N.$, lon. $173^{\circ} 39' 20'' E.$ This island is $6\frac{1}{2}$ miles long, East and West, and $5\frac{1}{2}$ miles wide at the East end, diminishing to 2 miles at the West end; it is of coral formation. There are two towns on the West end, and several on the East and S.E. parts, and it is thickly inhabited. The natives who came on board the *Peacock* said that the two ends of the island were at war with each other. They are very much the same in appearance as the natives of Drummond Island; were naked, and spoke the same dialect. This island affords neither wood, water, nor refreshments; from appearances, its inhabitants must be at times much stinted for food. They brought off nothing except a few cocoa-nuts, but in each canoe was a woman, so that their object could not be misunderstood; this does not speak much in praise of the whalers.†

KURIA or WOODLE'S ISLAND was, with Hopper and Henderville Islands, one of the first discoveries in the group, by Capts. Marshall and Gilbert. It was surveyed by the United States' Expedition.

It has four towns on it, which were estimated to contain between 4,000 and 5,000 inhabitants. Its geographical position is in lat. $0^{\circ} 14' 30'' N.$, lon. $173^{\circ} 27' E.$; its greatest length is 5 miles N.W. and S.E., and its greatest width, which is at its S.E. end, is $2\frac{1}{2}$ miles. The remainder is very narrow, and almost divided towards the centre. The N.W. portion has two small lagoons, 200 or 300 yards from the beach; the water in them is not so salt as the ocean. In one of them, the bottom consists of red mud on one side, while it is white clay on the other. They are used as fishponds by the chiefs. There is a reef extending to the N.W. nearly 3 miles.

The island is but partially clothed with trees, consisting of cocoa-nut, pandanus, and a few stunted bread-fruit. It has no outer reef, and may be approached very closely. It affords neither wood, water, nor refreshments. The natives who visited the ship brought off very little for trade. The females who accompanied the canoes wore the maro, and were thought to be better looking than the others of the group; but their whole manner was in keeping with the purpose for which their fathers and brothers had brought them off. The men were naked, and not so much disfigured by scars as elsewhere. The *Peacock* took off an Irishman, John Kirby, a deserter from an English whaler, who had not been roasted and eaten on his landing, but had had the chief's daughter given him as his wife. He had thus dwelt as one of them from February 11, 1838, to April 15, 1841. He said that the natives, though not professed cannibals, sometimes eat human

* From the North point of this island there was a small island in sight, which was at first supposed to be Duperrey's Ile du Nord; but if it be, instead of being located to the northward, as he has placed it, it bears nearly South of the North extreme of Nanouti. They found, on proceeding towards it, that it was a hummock connected by a reef with Nanouti; but no Sable Island could be seen. The tender passed round the opposite side of Nanouti, and did not see any island; and the officers of both vessels were fully convinced that no Sable Island exists.—*Narrative of the United States' Exploring Expedition*, vol. v. pp. 62-3.

† *Narrative of the United States' Exploring Expedition*, vol. v. pp. 63-4.

flesh ; but their food is generally fish. They do not eat fowls, and will not raise pigs on account of their filth. He gave, too, a sad account of the foreigners, whalers, and others who visited the island.*

APAMAMA or HOPPER ISLAND was one of the discoveries of Capts. Marshall and Gilbert, in the *Scarborough* and *Charlotte*, as related in the voyage of Governor Phillip, 1788. It was not seen by Capt. Duperrey. The latter commander believed it to be identical with the *Dundas Island* of the brig *Elizabeth*, 1809.† It must also be considered to be beyond doubt the same as the *Roger Simpson Island*, discovered by Capt. Bishop in the *Nautilus*.‡ It was also more lately seen by Capt. Frazer, of the American whaler *Francis*, who stated that he found in it an excellent port.§ All these observers, however, must fall short of the accuracy of the survey made in the United States' ship *Peacock*, in 1841. This is what is said of it :—

According to the observations then made by Capt. Hudson, it is in lat. $0^{\circ} 27' 21''$ N., lon. $173^{\circ} 57' 30''$ E. It has heretofore been represented as two islands on the charts, called on one, Simpson's, and the other, Hopper and Harbottle; but there is only one, joined by the same reef.

It is about 5 feet above the surface of the ocean, is 10 miles long N.W. and S.E., and 5 miles in width North and South. The land is continuous on the North and East sides, excepting two small strips of bare reef. There is anchorage on the West side, in an opening between the reef and the N.W. point of the island, which is about 2 miles wide. The soundings vary from 2 to 5 fathoms ; across it, in some places, the bottom is broken coral, in others coral sand. The entrance to the lagoon, although feasible, should not be attempted through this passage ; but there is a good passage into it on the S.E. side of the island, which is a mile wide. The inhabitants resemble those of the adjacent islands. It has a large population, but yields little more than will supply their wants. A small quantity of fresh water may be had by digging on the beaches ; wood and refreshments are not procurable for shipping.||

MAIANA or HALL'S ISLAND.—The name of Hall has been applied to this island both by Duperrey and by the American Expedition, though there is great reason to believe that it was previously seen by the original discoverers of the group, and then named *Gilbert Island*.¶ The name, Hall's Island, was given by the commander of the brig *Elizabeth*, in about 1809.** If so, it ought to be called Gilbert Island, and the other name has been dropped by Admiral Krusenstern, who reasoned from the imperfect data then in existence.

Capt. Hudson gives the following account from his survey of it :—

It is of coral formation ; the N.E. and S.E. parts are a continuous land, whilst to the S.W. and N.W. it consists of a reef and bank, in some places awash, with a sand-spit in its lagoon. The western sides of the island are, therefore, very dangerous, and should be approached with caution, as the sea seldom breaks on them, and the discoloration of the water is not at all times to

* Narrative U. S. Ex. Ex., vol. v. pp. 66—68.

† Purdy's Table of Positions, p. 154.

‡ Chart of Islands in the Pacific Ocean, seen in the *Nautilus*, in Dalrymple's Collection.

§ Krusenstern's Supplement, p. 153.

|| Narrative U.S. Ex. Ex., vol. v. pp. 64-5.

¶ Voyage of Governor Phillip, 1788.

** Purdy's Tables, p. 154.

be observed. The natives of this island have the same appearance as those already spoken of, and use the same dialect; only one canoe came off and held a short communication with the ship. The island appears to be thickly inhabited, but its natives have had little intercourse with whites. It affords neither refreshment, wood, nor water. It is 9 miles in length, according to the survey, in a S.E. and N.W. direction; it is situated in lat. $0^{\circ} 56' 45''$ N., lon. $173^{\circ} 4' 15''$ E. On its West side, on some of the banks, there is anchorage in from 10 to 15 fathoms water.*

TARAWA or KNOY† ISLAND.—In this island there is very considerable confusion of names, which, from the imperfect observations recorded, must be left in considerable uncertainty. Knoy Island was discovered in the *Scarborough* and *Charlotte*. A portion (probably) was named *Marshall Island*. Capt. Duperrey takes no notice of this name, but applies the name of *Gilbert Island* to it. In the periodical publications of 1810 there appeared an account of the situation of the islands seen by the brig *Elizabeth*. It was presumed to be in the year 1809, but our chart says 1804. The extracts have been preserved by Mr. Purdy, in his Tables, p. 154. In that there is an account of the discovery of an island, which was named *Cook's Isle*, the account of which agrees perfectly with that of the South side of Knoy Island, now under consideration. There is no doubt of their identity. It may be assumed, then, that Knoy, Cook, and Marshall Islands are meant for the same.

It was surveyed in 1841 by the United States' Expedition. It is in length 20 miles, trending N.W. and S.E. It is in lat. $1^{\circ} 29'$ N., lon. $173^{\circ} 5'$ E., and is of coral formation. The land is continuous and wooded, with the exception of four gaps, where the reef is bare. The South side is 12 miles long, and trends nearly East and West. On this part, near the West end, are three hummocks (which appear like islands in the distance), and several small sand-banks, which are connected by the same reef. This island has its lagoon, but it has the appearance of being an extensive bay, in consequence of the reef on the West side being a sunken one, on which is found 5 fathoms of water.

This island is partially wooded, having several groves of cocoa-nut trees on it, and a dense undergrowth. Several towns were seen on it, and it appeared to be thickly inhabited. It affords no supplies for vessels. The natives are entirely the same in appearance, in character, and customs, with the rest; they go naked, and speak the same dialect. They stated, though it is scarcely credible, that they had never seen a vessel before.‡

MARAKI or MATTHEW'S ISLAND was also one of the original discoveries by Capt. Marshall and Gilbert, in 1788. It is much smaller than either Charlotte or Knoy Islands, and is situated in lat. $2^{\circ} 0'$ N., lon. $173^{\circ} 25' 30''$ E. It is a lagoon island, without entrances, and of coral formation. It is but 5 miles long, N. by E. and S. by W., and $2\frac{1}{2}$ miles wide at its base, being of a triangular shape.

It appeared to be densely peopled, for many villages were seen, and after dark

* Narrative of the United States' Exploring Expedition, vol. v. p. 64.

† Knoy Island in the American work, which is a perversion. It is Knoy Island in the original.

‡ United States' Exploring Expedition, vol. v. pp. 68—70.

a large number of fires were burning. The natives appeared afraid of the ship. Their dialect and customs were the same as the rest of the group.

APIA or CHARLOTTE ISLAND.—The name Charlotte Islands was applied to this collection of islets by Admiral Krusenstern,* from the idea that the term, *The Six Islands*, was applied by their discoverer, Capt. Marshall, in the *Charlotte*.† In the original charts the names of these six islands were given as *Marshall*, *Allen*, *Gillespy*, *Clerk*, *Smith*, and *Scarborough*; but they all lie in one reef, so must be taken as one. They were not seen by subsequent navigators, particularly by Duperrey, who would have cleared up the discrepancy. The United States' Expedition surveyed it in 1841, and gives the following account of it:—

Apia or Charlotte Island is in lat. $1^{\circ} 52' N.$, lon. $173^{\circ} 2' E.$ It is a lagoon island, consisting of a string of coral islets, situated within a reef, which is 6 or 7 feet above the water. The reef has a bluff front, and is much worn by the sea. There is no coral sand. Its length in a N.E. and S.W. direction is 16 miles, and its average breadth 5 miles. On the East side of the island the land is covered with cocoa-nut and pandanus groves, with some undergrowth. The N.W. and West side is a continuous reef, 4 or 5 feet above the water's edge, on which are many islets. About the centre of the reef, on the S.W. side, is a ship's channel into the lagoon, which is half a mile wide. Near its entrance is a small islet, which stands alone, and is a good mark for the entrance. There is no island in the lagoon, as shown in the French chart of Duperrey.

This island would appear to be thickly inhabited, from the number of towns on it. The natives do not appear to have had much intercourse with strangers. There was but one woman seen, and she was as ugly as those previously seen had been pleasing in their looks. They are the same race, and speak the same dialect. At an islet near the entrance to the lagoon, about sixty gallons of water were obtained from the native well, but it was flat and brackish. No other supplies can be procured at this island.

In the centre of the little village that the party landed at was one of the sacred stones, a flat slab of coral rock, an object of worship, and surrounded by votive offerings. During the survey the tender *Flying Fish* got aground inside the lagoon: the moment this was discovered by the natives, they began to flock around, and gave every evidence of their disposition to attack her; from this they were only prevented by being fired at. Every preparation had been made by them, in the course of the succeeding night, and they came in great numbers just at the time when, fortunately, the vessel again floated; which, when the natives discovered, they made outrageous signs of disappointment.‡ This incident will afford a hint as to the necessity of the ever-required caution in these parts.

PITT ISLAND (TOUCHING ISLAND).—Of the discovery of these two islands there appears to be no exact record. They were not seen by Marshall and Gilbert, nor by Duperrey; but they were placed too far to the East on the chart. The name of *Touching Island* is given to the westernmost island on Arrowsmith's

* Krusenstern's *Memoir*, vol. ii. p. 383.

† *Voyage of Governor Phillip*.

‡ United States' Exploring Expedition, vol. v. pp. 69—71.

chart. The following is Capt. Hudson's (of the United States' Exploring ship *Peacock*) account of them :—

There are two islands known under this name ; the largest is called by the natives *Taritari* (*Touching Island*), and the smallest *Makin* (*Pitt Island*). The latitude of the southern port of *Taritari* is $3^{\circ} 8' N.$, longitude $172^{\circ} 48' E.$ This island is of the figure of a triangle, with its apex to the South, and its sides are above 14 miles in length. The S.E. is a continuous grove of cocoa-nut and pandanus, with some undergrowth. On the two other sides is a reef, which is awash, excepting the N.W. point, in which there is a small inlet.

Makin is of much smaller dimensions, being but 6 miles long ; it varies in width from half a mile to a mile. Its northern point lies in lat. $3^{\circ} 20' 43'' N.$, lon. $172^{\circ} 57' E.$ The entrance into the lagoon has $4\frac{1}{2}$ fathoms of water, and is about one-third of a mile in width. This small island is the seat of government, and the natives now unite both names under the one of *Makin*. When the *Peacock* approached, it soon became evident that the island was thickly inhabited ; for, on reaching the lee side, above twenty canoes came off, with from five to ten natives in each ; but in one of them was a white man, Robert Wood or Grey, who had been left on the island by an English whaler, at his own request, seven years before. He had seen no white man since he landed. He had always been treated kindly ; at first they almost deified him. They have no wars, and very few arms, and seldom quarrel, except about their women. They are very different in appearance and character to those of the other islands. Their features are regular, with glossy black hair, flowing in ringlets. They were also of a lighter colour than the rest of the natives with whom they are grouped ; their figures are, for the most part, rotund, and they seem to have an abundance of food to become fat upon. In walking they appeared like a moving mass of jelly. The men are very handsomely tattooed ; the women are well treated, and never offered for traffic. Wood represented the women as outnumbering the men, and said they were very handsome. There are five towns on the island, which, according to the same authority, contain about 5,000 inhabitants.

There were no quadrupeds found, except rats, which were in great plenty. There were but few birds.*

MARSHALL ARCHIPELAGO.

This extensive collection of islands lies between lat. $4^{\circ} 45' N.$ to $12^{\circ} 0' N.$, and is separated from the Gilbert Islands by a channel 50 leagues broad. The islands were discovered in 1788, by Capts. Marshall and Gilbert, of the English navy, in the ships *Scarborough* and *Charlotte*, in their voyage from Port Jackson to China, which voyage originated in the first colonization of Australia. As Capt. Marshall was the principal officer of the expedition, his name has been applied to the whole archipelago by Krusenstern and others ; that of Capt. Gilbert has been given to that to the southward. There is considerable confusion in the original accounts, Capt. Gilbert having named some of the islands already

* United States' Exploring Expedition, vol. v. pp. 73—75.

named by Capt. Marshall; and Capt. Bishop, who ten years later discovered some of them, has also named them, which has caused great difficulties in the nomenclature, that are not decreased by the great discrepancies between the respective longitudes given by these officers.

Besides the discoveries of Capt. Marshall, there is another range of islands, occupying the same extent of latitude, at 3 degrees to the westward of them. These islands have been accidentally discovered by various navigators proceeding to India. Capt. Kotzebue, in his first voyage, in 1817, intended to have examined them, but he passed through the range in a dark and stormy night, and was afterwards driven so rapidly to the West, by a strong current, that he could not see them. In his second voyage he discovered three groups belonging to this chain. Capt. Duperrey also determined one group; since which they have been visited by Capt. Hagemeister in 1831; by Capt. Chramtschenko in 1829 and 1832; and by the United States' Exploring Expedition in 1840. From the accounts contained in these voyages we have drawn up the following imperfect description.

The archipelago is separated into two parallel ranges, which Kotzebue tells us are called by the natives RADACK, the easternmost, and RALICK, the western range of islands. They are almost without exception of the usual character of coral islands; a narrow belt of low land or reef, unfathomable on the outer shore, enclosing a lagoon more or less shallow. The productions or capabilities of the group do not appear to be of very great importance, or their amount has not been very well ascertained. The natives on some of the groups are very numerous, and, like other savages, are not to be trusted. Their canoes have the same admirable sailing and seaworthy qualities which distinguish those of the Western Pacific. The description of the archipelago commences from the southward.

MULGRAVE or MILLE ISLANDS.—The second of these names was given by their discoverer, Capt. Marshall, in 1788. They were afterwards examined by Capt. Duperrey and Capt. Chramtschenko. The following recent account, by M. Dutailis, is the most explicit.

The Mulgrave Islands appear to form a chain of atolls, the extent of which is not yet determined. Together they form a sort of quadrilateral figure, on one of the sides of which (that on the East) is a double belt of islands.

These islands, almost all of which are connected with each other at low water, are sometimes separated at high tides by the sea, which more often covering these reefs does not leave sufficient depth for a boat to be able to clear it for an extent of nearly 40 miles; for after a careful search, only one pass for a large ship and another for boats could be found.

Having been formed successively from coral, marine productions, and the debris of vegetation, they have in the course of ages acquired their great breadth. Here and there are grouped some trees, among which are the native houses. These smaller masses of verdure, intersected by sandy beaches towards the interior, and by coral blocks towards the outside, give to the chain the appearance of small islands, on which cocoa-nut trees, bread-fruit trees, &c., form clumps of beautiful verdure, having a most agreeable and cheerful appearance.

The parts covered with trees, being the largest, generally form the points around which the current runs very strong.

In general, the whole chain is very steep-to on the outside, and only increases on the side of the interior lagoon, where it is less disturbed by the sea, and where the coral banks are in course of formation, some of them already uncovered at low water, and projecting frequently a cable's length off the land. When they reach the level of the water, they become, like the islands already formed, covered in their turn by sand and some vegetables, and will in the lapse of time be of importance.

The space enclosed by these islands is a real sea, navigable for every description of vessels. The bottom, generally at the depth of 22 to 27 fathoms, rises now and then nearer the surface, and shows in white patches, which thus indicating the dangers, also point out the points where the anchor may be dropped. These banks bestrewed with rocks are nevertheless dangerous to anchors and moorings, because they will break the one and chafe the other, of both of which M. Dutailis says he had sad experience.

To take the best position, attention ought to be paid to the rise of the tide; its level has great influence on the quality of the bottom, and it ought not to be chosen if possible but at low water. The passage for large ships is between *Barr Island* (pronounced as if three r's) and the Island of *Tokoeoa*, the first to the East and the other to the West of the entrance.

To reach the anchorage with winds from the eastern quarter, the only point for attention is to take up such a position as will allow you to range as near as possible to the pitch of the eastern reef, and rounding the bank attached to Barr Island as near as you please; it is shown by the whitish water; by this means you will avoid a small patch which is to the S.E., and over which the flood tide runs with a velocity of $1\frac{1}{2}$ knots. This patch is, until half tide, indicated by very strong rippings, and becomes nearly awash at low water.

In general it is better to enter or leave with the tide, unless indeed the breeze is fair and of sufficient force to overcome the strength of the current. The less distance you are withinside the anchorage, the less difficulty there will be in getting out with westerly winds.

There is another passage, but for boats only, between *Anil Island* and *Bouguenieu*. Bouguenieu is the first islet to the West of Tokoeoa. The distance between these two passes may be about $1\frac{1}{2}$ miles.

Position of the anchorage, lat. $6^{\circ} 14' 37''$ N., lon. $171^{\circ} 56' 6''$ E.; * variation, $9^{\circ} 45'$ N.E.

Capt. Wilkes says they are in lat. $5^{\circ} 59' 15''$, lon. $172^{\circ} 2' 33''$, but his account will not coincide with that given above.

ARROWSMITH or MUDURO ISLANDS.—This is a discovery of Capts. Marshall and Gilbert, though their account and chart of them are not very definite. Capt. Chramtschenko examined them in detail. Their length, W.N.W. and E.S.E., is 18 miles, their breadth being 11 miles. They are of the usual coral formation, with a lagoon, and are inhabited. According to the U.S. Exploring

* *Annales Hydrographiques*, vol. i. pp. 154—156.

Expedition, their S.E. point is in lat. $7^{\circ} 5' N.$, lon. $171^{\circ} 23' 54'' E.$, identical with previous observation.

DANIEL ISLAND; PEDDER ISLAND.—To the West of the foregoing the same ships discovered two groups, to which these names were applied, calling the broad and open channel separating them from the Arrowsmith Islands *Fordyce Passage*. Capt. Chramtschenko did not see them. Capt. Hudson, U.S. Exploring Expedition, passed along the West side of Pedder Island, and through Fordyce Passage. He says that Pedder and Daniel Islands are of coral formation, and are inhabited.* They are called *Arno* on Kotzebue's chart.

AUR, IBBETSON, or TRAVERSEY ISLANDS.—On Arrowsmith's chart a group, Ibbetson Islands, is marked, which beyond doubt are the same named by Kotzebue after the Marquis de Traversey, and by the natives Aur (or Aour).

This group is 13 miles long N.W. and S.E., and 6 miles broad. On the surrounding reef are thirty-two islands. The population is numerous when compared with the other islands, but scanty for its size; it is between 300 and 400. *Stobual Island* has a very pleasant aspect. The anchoring place was in lat. $8^{\circ} 18' 42''$, lon. $171^{\circ} 12' E.$ (by chronometer, $171^{\circ} 8' 14''$); variation, $11^{\circ} 58' 30'' E.$ Kotzebue procured great quantities of cocoa-nuts here.

KAVEN or CALVERT ISLANDS, BASS-REEF-TIED or ARAKTCHEEFF ISLANDS.—This group was discovered on board the ships *Scarborough* and *Charlotte*, June 29, 1788, and were named *Calvert Islands*, probably by Capt. Gilbert. The *Nautilus* saw some islands, July 5, 1799, which were then named the *Bass-Reef-tied Islands*, which are identical with the Calvert Islands. Capt. Kotzebue says their native name is *Kaven* (or Kawen), and he applies the name of Araktcheeff (or Araksheef) to them.

This group is 30 miles long N.W. and S.E., and $11\frac{1}{2}$ miles broad. The whole cluster consists of sixty-four islands, and was well surveyed by Kotzebue. The group and its people are precisely similar to those of the Otdia, to the northward. *Kaven* or *Araktcheeff*, to the N.W., is the largest island of them. It is $2\frac{1}{2}$ miles long and three-quarters of a mile broad. It is in lat. $8^{\circ} 54' 21'' N.$, lon. $170^{\circ} 49' E.$ The S.E. island is in lat. $8^{\circ} 29' 30''$, lon. $171^{\circ} 11' E.$ High water, full and change, $1^h 52'$; greatest rise, 4 feet. Kotzebue found very good water in pits on some of the islands, but provisions were not very abundant.†

EGERUP or BISHOP JUNCTION ISLANDS.—This is four of two groups, which together were called the *Chatham Islands*, from the voyage of the *Scarborough* and *Charlotte*, probably by Capt. Gilbert. The other group adjoining, Otdia, appears to have been considered as a portion of it, and Capt. Marshall took them for the *Barbadoes Islands*, marked upon Anson's chart. They were surveyed by Kotzebue, who states the native name to be Egerup, and also gives the name of *Tschitschagoff* to them.

Egerup lies to the southward of Otdia, and is considerably smaller. Its length is 24 miles, and its breadth is 4 miles. The whole circle consists of one reef, and contains but very few islands. The South point of it is an island,

* Voyage of Governor Phillip; Narrative of the United States' Exploring Expedition, vol. v. p. 107.

† Kotzebue's Voyage to the South Seas, vol. i. p. 357.

probably named *Egerup*, the only one seen with cocoa-nut trees and people; but these, it was said, were limited to one man and two old women. A passage near this perhaps may be navigable, but is dangerous from its numerous turnings; there appears but little inducement for visiting the group.

OTDIA or ROMANZOFF ISLANDS lie to the North of the preceding. Both these names are applied by Kotzebue, but the remarks relating to their early discovery also belong to those of the *Egerup* group, as above stated.

This group was minutely examined by Kotzebue, in January, 1817, and he has given a large and detailed chart of it. It is of an irregular oval form, 28 miles long in a W.S.W. and E.N.E. direction, by about 10 miles in breadth. It consists of the usual encircling reef, on which are distributed sixty-five islands, of various magnitudes. *Otdia* is the easternmost and largest, about 2 miles long. The anchoring place inside the island, which was called *Christmas Harbour* (or *Port Noël*), was ascertained to be in lat. $9^{\circ} 28' 9''$ N., lon. $170^{\circ} 16' 5''$ W.; variation, $11^{\circ} 38' 30''$ E. As the low land here has no influence on the atmosphere, the barometer falls and rises as uniformly as it generally does between the tropics. The mean of the tidal observations at *Otdia* gave for the time of high water, full and change, $2^h 30'$. The greatest range was 7 feet. The population on it is scanty, and indeed all the southern islands are uninhabited. The people were very friendly to Kotzebue, who remained here a considerable time. To the South of it is an island called by Kotzebue *Egmedio*, near to the S.E. angle of the reef; to the South of it is a small high island.

The reef is quite continuous to the N.W. of *Otdia*, and on it stands a connected chain of small islands, reaching as far as *Ormed Island*, at the North part of the reef, 8 miles from *Otdia*. The anchorage in this is in lat. $9^{\circ} 33' 16''$, lon. $170^{\circ} 10' 58''$ E.; variation, $12^{\circ} 14'$ E.

From *Ormed*, the North side of the reef, also quite continuous, runs to W.S.W. 8 miles to *Bird Island*, and 9 miles still farther to *Goat Island*, from whence to the West end of the reef is 5 miles.

There are several channels through the reef, all on the lee side. The first is $1\frac{1}{2}$ miles S.E. of the West point, narrow and impracticable; the next is *Rurick Strait*, 5 miles farther round the reef, by which Kotzebue entered. From hence the reef continues, without islands, nearly 20 miles, to *Schischmareff Strait*, in every way preferable to the *Rurick Strait*, as a ship can beat in or out with the usual trade-wind. To the East of this again is *Lagediak Strait*, 4 miles from the S.E. point of the group.*

LEGIEP or COUNT HEIDEN ISLANDS.—This group, first seen by Capt. Kotzebue, November 5, 1817, perfectly resembles the others, though considerably smaller. Its greatest extent was 19 miles. There is a passage wide enough for a ship on the western side. The centre of the group is in lat. $9^{\circ} 51' 30''$ N., lon. $169^{\circ} 13' 30''$ E.; variation, $10^{\circ} 56'$ E. The natives of the islands are tall, handsome, robust men, advantageously distinguished from the other Radackers. They live chiefly on fish.† In his second voyage Kotzebue

* Kotzebue's *Voyage to the South Seas*, vol. ii. pp. 12—87.

† Kotzebue's *First Voyage*, vol. ii. p. 222.

examined the group more closely, and consequently found it was one-half larger than he at first supposed. On the N.W. of the group are several large islands, well covered with cocoa-nut trees. There are two broad entrances to the inland sea, which were accurately examined, and found to be perfectly safe for a ship-of-the-line, since, according to their direction, you may sail in or out with the trade-wind. From this cause, and the appearance of excellent anchorage, Kotzebue recommends this group to any navigator wishing to put into Radack. The N.W. point of the group is in lat. $10^{\circ} 3' 40''$ N., lon. $169^{\circ} 1' 57''$.

TEMO or STEEP-TO ISLAND, a small island seen in the *Nautilus*, to which the latter name was applied. Capt. Kotzebue says its native name is Temo, and is in lat. $9^{\circ} 58'$ N., lon. $169^{\circ} 45'$ E., at the distance of 20 miles E.N.E. $\frac{1}{2}$ E. from the Legiep Islands.

MIADI or NEW YEAR ISLAND was discovered by Kotzebue, January 1, 1817. It is a low, woody island, 3 miles long North and South, and three-quarters of a mile broad. From the North side a very long reef extends. They could not effect a landing on it. It is clothed with a lovely verdure, and is inhabited by a similar race to those on the Kutusoff Islands. The island seems to produce but little fruit. The position of the middle of the island is lat. $10^{\circ} 8' 27''$, lon. $170^{\circ} 55' 34''$ E.—(Kotzebue's First Voyage, vol. ii. pp. 4—8.)

AILU, or TINDAL AND WATTS, or KRUSENSTERN ISLANDS.—Admiral Krusenstern considers this group to be the same as that named by Capt. Marshall, in 1788, Tindal and Watt's Island. Kotzebue supposed it to be a new discovery, March 1, 1817, and applied the name of the great hydrographer to it. Its native name is Ailu (or Ailou). Kotzebue surveyed it.

The group is 15 miles long and 5 miles broad. He entered it by a channel which was narrow, but deep towards the North part. The eastern side of the group is formed by a chain of islands, but the western side consists of a coral reef. *Ailu*, which gives its name to the whole, is in the South part. It is small, scarcely a mile long; it has a pleasing appearance, and is distinguished from the rest by its tall palm trees. *Capeniur Island* is the northernmost of the group. Kotzebue's anchorage was in lat. $10^{\circ} 17' 25''$ N., lon. $190^{\circ} 0' 40''$ W.; variation, $11^{\circ} 15' 30''$ E. High water, full and change, $4^h 53'$, rise 8 feet.

TAGAI or SOUWOROFF ISLANDS, UDIRICK, or KUTUSOFF, or BUTTON ISLANDS.—On a chart inserted in the Voyage of Governor Phillip, two islands are marked as the *Button Islands*, from the authority of Capt. Marshall, 1788. They were not inserted on any other chart, and thus Kotzebue considered them as a fresh discovery, May 21, 1815, on his passage to Kamschatka. The two groups taken together have almost a North and South direction, and extend thus for $25\frac{1}{2}$ miles. *Kutusoff*, or *Udirick* (or *Uderick*), is the only one inhabited. The island first seen by Kotzebue had a beautiful grove of cocoa-nut trees. The people came off and were friendly; they were of a black colour, with straight black hair.

Souworoff or *Tagai*, like the former group, consists of small islands, connected by coral reefs, and seemed to contain deep water in the centre.

The group appears uninhabited, and, though it is thickly covered with trees, not a single palm tree was to be seen. The channel separating the two groups is

3½ miles in length, free from rocks, and unfathomable depth.* The latitude of the channel is 11° 11' 20", longitude, 169° 50' 37" E.; variation, 11° 18' E.

BIGAR or DAWSON ISLAND is the northernmost of the Radack chain. Its second name is derived from Capt. Marshall's chart. Bigar, from the statement of a native to Kotzebue, forms a circle, consisting, for the most part, of reefs, and contains only two small islands; a third is laid in the middle of the basin, and all are overgrown with low bushes. There are some boat entrances, under the lee of the island, where the natives penetrate to catch turtle and sea-fowl.* The centre is in lat. 11° 48', lon. 170° 7'.

The RALICK CHAIN runs parallel to the Radack chain just described, and extends to the same parallel of latitude. The character of the separate groups composing it appears to be the same, and the inhabitants of each are acquainted with each other. The islands of this range have not been so well examined (with some exceptions) as the eastern chain.

BIGINI or PESCADORE ISLANDS.—On September 3, 1767, Capt. Wallis discovered *two* islands, about 35 miles apart, which he supposed to be the *Pescadores* placed on Anson's chart; but, from some vagueness in his positions, they could not be well identified. Capt. Kotzebue, in his second voyage, has made the matter more clear by the discovery of *three groups*, of which the easternmost he supposes to be the group in question. Its native name is Bigini. According to Kotzebue, it is a group of low, thickly-wooded coral islands, forming as usual a circle round a basin. The greatest length, East and West, is 10 miles. Their aspect is pleasant, but no sign of inhabitants; so that if they be really the Pescadores, the people must have long ago become extinct, as no monument of their existence is now visible. The centre of the group is in lat. 11° 19' 21" N., lon. 167° 24' 57" E.†

Capt. Hudson, of the U.S. ship *Peacock*, says it is of a triangular shape, and has on its reef several islets and some sand-spits: the former are covered with a few low bushes, but it has no cocoa-nut or pandanus trees, and affords nothing but the pearl-oyster and turtles in the season. There are two entrances into the lagoon; one about the middle of the North side, the other on the East side. It has no inhabitants, and is incapable of supporting any.‡

RADOKALA or RIMSKI-KORSAKOFF ISLANDS is the second of the three groups discovered by Kotzebue. He named it after his second lieutenant. It is, according to his estimate, 54 miles in extent, in an E.N.E. and W.S.W. direction; its East point being in lat. 11° 26' 45", lon. 167° 14' 20" E., and its S.W. point in lat. 11° 8' 20", lon. 166° 26' 30".

The U.S. Exploring ship *Peacock* examined it, but could not effect a landing on account of the surf. Although a few persons were seen on it, yet there was no appearance of permanent inhabitants. It seemed to be without any vegetable productions capable of sustaining life. Rimski-Korsakoff, though represented on the charts as one island, consists of two. The smaller one lies to the southward, and is 14 miles long by 3 miles wide. The larger island is about 26 miles long, trending N.E. and S.W. It has an entrance to its lagoon on the South side.§

* Kotzebue's First Voyage, vol. ii. p. 154.

† Narr. U.S. Ex. Ex., vol. v. p. 108.

‡ Kotzebue's New Voyage, vol. ii. p. 272.

§ *Ibid.*

UDIA-MILAI or ESCHSCHOLTZ ISLANDS is the westernmost of these groups. Kotzebue, in October, 1825, named this group after the naturalist of his expedition. He saw only the western part of the group, which he places in lat. $11^{\circ} 40' N.$, and lon. $166^{\circ} 24' 25'' E.$ A violent gale prevented him from examining its extent eastward. Capt. Chramtschenko also saw only its western portion, so that its eastward islands remain unknown.

SHANZ ISLANDS, a group of thirteen islands, discovered May 30, 1835, by Capt. Shanz, of the Russian navy, in the imperial ship *America*, on her passage from Port Jackson to Kamtschatka. Mr. Reynolds mentions a group, discovered by a Capt. Closly, near this longitude, about 30 miles to the southward, which prevents them being considered as the same. The Shanz Islands extend about 4 leagues from N.W. to S.E., and are 5 miles broad. Their centre is in lat. $10^{\circ} 5' N.$, lon., from eight chronometers, $166^{\circ} 4' E.$ *

KWADELEN or CATHARINE ISLANDS.—The English ship *Ocean* discovered, in 1804, three groups of islands, which were named Margarettia, Lydia, and Catharine. The Islands *Kwadelen* (or *Quadelen*), *Namou*, and *Lileb*, placed upon Kotzebue's chart, so exactly agree with these three *Ocean Islands*, that there can be no doubt of their identity. The Kwadelen or Catharine Islands, the northernmost, are placed in lat. $9^{\circ} 14' N.$, lon. $167^{\circ} 2'.$

LYDIA or LILEB ISLANDS are the centre, and lie in lat. $9^{\circ} 4'.$ lon. $165^{\circ} 58'.$

MARGARETTA or PATERSON ISLANDS is the southernmost of these groups. There can be no doubt of the identity of the Margarettia Island of the ship *Ocean*, in 1804, and the Paterson Islands of the brig *Elizabeth*, in 1809. This island, or as it appeared a group of islands, had a very fertile appearance, being one continuous chain of cocoa-nut trees. It lies about W.N.W. and E.S.E., low, and well wooded. Latitude of South extreme, $8^{\circ} 55' 48''.$ longitude, $167^{\circ} 42' E.$

TEBUT is placed on Kotzebue's chart in lat. $8^{\circ} 25' N.$, lon. $168^{\circ} 17'.$

NAMOU and ODIA, or MUSKILLO GROUP, and PRINCESSA ISLAND.—There is some little confusion in this group, from the fact of its being separated into two, which was not known until Capt. Chramtschenko passed along the western side in 1832, and made a minute survey of them.

The name *Muskillo Group* was given by Capt. Bond, who saw them the day after his making the Baring's Islands, December 16, 1792. He ranged along the coasts of above twenty small islands, lying nearly S. by E. and N. by W. by compass. They all appeared connected by reefs and ledges, distant from each other from 1 to 6 miles; they are all well covered with trees, and full of inhabitants, which were seen in great numbers on the sandy beach. They are very low and dangerous, and a ship in thick weather might run on the reef without seeing the land.†

According to Capt. Chramtschenko, the group is composed of two portions joined by a very narrow isthmus; at a short distance it might be taken for two groups. The island forming the isthmus lies in lat. $8^{\circ} 0' N.$, lon. $168^{\circ} 13'.$; the northernmost island, lat. $8^{\circ} 10'.$ lon. $168^{\circ} 0'.$; the southernmost, lat. $7^{\circ} 46'.$

* Krusenstern, Supplement, pp. 162, 172.

† Oriental Navigator, p. 689.

lon. $168^{\circ} 23'$, so that the islands have an extent of 30 miles in a N.W. and S.E. direction. Their breadth is $11\frac{1}{2}$ miles. The natives call this group *Namou*. The name of *Lambert* was given to the northernmost portion, and *Ross* to the southern, by Capt. Dennet of the *Britannia*, but the prior name must be that retained. This latter commander also saw an island, which he called *Princessa Island*, in lat. $8^{\circ} 20'$, lon. $167^{\circ} 30'$; it has not since been seen, though Capt. Hagemeister states that he saw an island near this spot, but Capt. Chramtschenko must have passed it if it existed. Admiral Krusenstern is therefore convinced that it does not, and that the South portion of the *Namou* group has been taken for it.*

HELUT or ELMORE ISLANDS.—This group was named by the *Elizabeth*, in her passage from Port Jackson to China. The discoverer saw two small round islands, moderately high, but Capt. Chramtschenko says that it consists of a large island and nearly twenty smaller ones, connected by coral reefs, extending 20 miles in length from N.N.W. to S.S.E., and $12\frac{1}{2}$ miles in breadth. They are sometimes called the *Chramtschenko Islands*. The southernmost island is in lat. $7^{\circ} 15'$, lon. $168^{\circ} 46'$, nearly according with the positions originally stated.† Capt. Chramtschenko says that the natives call this group *Odia*; on the charts by Kotzebue, and since followed, it is called *Helut*.

KYLI or BONHAM ISLANDS.—The brig *Elizabeth* discovered, in 1809, “a very extensive island, a group of islands joined together by low sand (coral?) banks, which I suppose are covered at high water. From one of these banks came a very handsomely built small canoe, with four men in it, stout and well made, and apparently friendly. From the S.E. point of the island a very dangerous, low, sandy point, with scarcely a tree or bush on it, extends to the eastward and northward, 2 or 3 miles, with a very heavy surf breaking on it.” The island was called *G. Bonham's Island*.‡ This group has since been examined by Capt. Duperrey, who called the northern portion *Coquille Islands*, and the southern part *Elizabeth Islands*, from the ships which discovered them. According to Capt. Chramtschenko, the group is 30 miles long in a N.W. and S.E. direction, and 20 miles broad. It is composed of four large islands, nineteen others smaller, and one in the centre of the group, separated from the others. There are three entrances to the group, one to the North, another to the West, and the third to the S.E. Krusenstern considers that the *Kyli* of Kotzebue's chart cannot be Bonham Islands, but the names are still repeated together.

NAMURECK or HUNTER ISLAND.—This island was first seen by Capt. Dennet; it is stated to be 2 miles in extent from N.W. to S.E.; the position assigned was lat. $5^{\circ} 46'$, lon. $169^{\circ} 0'$. Its position agrees with the *Namureck* of Kotzebue's chart, and was named *Hunter Island*.

EBON or BARING ISLANDS.—Baring Islands were discovered by Capt. Bond, in the *Royal Admiral*, December 15, 1792. They are two in number, both very low, and covered with trees, amongst which the cocoa-nut was very

* Krusenstern, vol. ii. p. 374, and Supplement, p. 150.

† Purdy's Tables to Oriental Navigator, p. 154; Krusenstern, vol. ii. p. 374, and Supplement, p. 150.

‡ Purdy's Tables, p. 154.

conspicuous. They appeared circular, and of no great extent, seemingly joined by a reef; they were named after the chairman of the court of directors of the East India Company. The position was only inferred as lat. $5^{\circ} 35' N.$, lon. $168^{\circ} 13' E.$; variation, $10^{\circ} E.$ *

BOSTON or COVEL ISLANDS.—From information given by Capt. Duperrey, these islands were discovered, May 25, 1824, by an American vessel, under Capt. George Ray, who called them Boston Islands. The name of Covel (or Cowell) group is from an American commander, who thought them a new discovery in 1831. Capt. Hagemeister places them in lat. $4^{\circ} 39'$, lon. $168^{\circ} 50'$. They are the southernmost of the Ralick chain. The following is a recent account of them :—

The group consists of thirteen low coral islands, covered with cocoa-nut trees, and connected by coral reefs forming a large lagoon inside. The group is 30 miles in circumference, has a good ship passage leading through the reef to the lagoon on the West side, and is thickly inhabited by an able-bodied race of men, who are of a light copper complexion. They have large canoes, or rather proas, capable of carrying fifty men. When Capt. ——— visited these islands, in February, 1845, he was attacked outside the reef by three proas carrying 150 men, and the vessel was nearly taken, but after a struggle, in which four of his crew were severely wounded, the vessel was retaken.

The group, according to this authority, is in lat. $4^{\circ} 30' N.$, lon. $168^{\circ} 42' E.$ †

CHAPTER XXXII.

THE CAROLINE ARCHIPELAGO.

THIS extensive range of islands was, until recent times, comparatively unknown. This ignorance, and the terrible accounts of their dangerous character given by various navigators who had crossed the chain, caused them to be the subject of the greatest dread to all commanders sailing in their vicinity. All these fears and doubts have, like most others of their kind, been dispelled by the more exact knowledge which modern science gives of the actual character of the subjects it is applied to. It is chiefly to the voyage of Capt. Duperrey, in the French royal ship *La Coquille*, in 1823, and to the surveys by Rear-Admiral Lütke, of the Russian corvette *La Sèniavine*, that we owe our present knowledge of these islands.

It has been thought that the first notice of any portion of these islands was given by *Diego de Roche*, a Portuguese, in 1525, as the *Sequeira Isles*, but it is

* *Oriental Navigator*, p. 689.

† *Nautical Magazine*, November, 1848, p. 577.

probable that his discovery was to the westward of the group. The same may be said of the *Reyes Islands*, discovered by *Alvaro de Saavedra*, in 1628. The first whose claims have any weight are *Villalopos* and *Miguel Lopez de Legaspi*; the first in 1543, the second in 1565, but neither of their discoveries can with certainty be recognised. The celebrated *Sir Francis Drake* also discovered a portion of the range, September 30, 1579. The next in order is *Lorenzo de Baretto*, who, in 1595, saw a large inhabited island in the group.

In 1686 the Spanish admiral, Don Francisco Lazeano, discovered a large island, to which he gave the name of Carolina, in honour of the reigning king, Charles II., but which it is not now known. It gives the name to the archipelago. The name of the *New Philippines* has also been applied, but that has long been in disuse.

Among the more complete early accounts of the Carolines is that by the Jesuit padre, *Juan Antonio Cantova*, who visited several of the islands in 1721, and during his second voyage thither, in 1731, was killed at the Island Mogmog.* Several navigators have visited portions since that time, as is related in the subsequent particulars; but, as stated in the first instance, the chief sources of information are the works of Lütke and Duperrey. Of the first-named commander it may be stated, that it was his intention to have drawn up an account, strictly nautical, of the portions of the group visited by him, but it was omitted for want of leisure in the nautical portion of his work.†

The Caroline Islands, according to Krusenstern and Lütke, extend from the Pelew Islands on the West, to Ualan on the East, and from 2° to 12° North latitude. But this distinction is somewhat arbitrary. The natives of the Radack and Ralick chains belong to the same race, so that the proposition of Dr. Chamisso to include all these islands in the single denomination of the Marianas is not without weight. But if it be necessary to adopt any divisions, it would be necessary to distinguish that part of the Carolines extending from the Mortlock to the Ouluthy group, which alone is inhabited by a nautical and commercial people. The nations more East or West do not participate in this distinction.

The information collected by the missionaries, and the charts drawn up by them from native reports, were for nearly a century the only guides to navigators. But they could neither determine their relative sizes or positions; so that many islands scarcely visible on the surface of the ocean, having a name as well as the larger groups, were placed as if miles in extent, and groups of 10 or 15 would occupy the extent of several degrees; this made the charts an inextricable labyrinth. Then the commanders who crossed the line of the archipelago in different directions, instead of meeting with entire archipelagoes, were astonished to find either no indications of land, or else some small spot to which they were delighted to apply some favourite name, which then took their places in the chart, without superseding the older ones. The native names also are frequently repeated, and disfigured both by the different pronunciation in various parts of the group, and by different systems of orthography. Such a chaos arose from all this, that any

* *Lettres Edifiantes et Curieuses*, tome xviii. p. 188. Burney has given an English version of this in his *Chronological History*.

† *Voyage du Séniavine*, Part. Naut., Introd.

elucidation became a hopeless task. Such was the state of their geography before the *Coquille* and the *Séniavine* cleared up all doubts, and declared their real character.

The Caroline Archipelago consists of forty-eight groups, containing between four and five hundred islands. This would at first sight appear to be a most extensive tract of land; but, as Capt. Lütke says, that, "with the exception of the high islands of Ualan, Pouinepet, and Roug, if they were all collected together, and then placed above the spire of the fortress of Petropaulovski, they would hardly cover all St. Petersburg and its suburbs. The length of all the islands joined together (I do not reckon the reefs) would be 25 German miles; the breadth of but very few of them exceeds 200 yards, and half of them are beneath this measurement. Taking the mean of 200 yards, they would have a surface of less than 1 German square mile."

The total population of the Carolines (excepting Yap and the Pelew Islands) may be about 9,000 souls, which would give a population of 500 individuals to the square mile, greatly exceeding the most populous parts of Europe. But the coral islands cannot be compared in this respect with a continent. In these the whole surface of a coral island is covered with bread-fruit and other trees for food, and it might even be supposed that a mile square would sustain 3,000 individuals. The disproportion, then, is not so great; but if we include the three high islands, the disproportion becomes less: the Island of Ualan contains $1\frac{1}{2}$ German square miles; Pouinipet, 6 German square miles; and Roug may have 9 German square miles, which will bring down the average to what is stated above.

The inhabitants of all these islands are scions from the same stock. Chamisso considers them as the same as all the Malay tribes peopling eastern Polynesia. We cannot enter here upon their characteristics more than will be found in the subsequent descriptions. The works of Chamisso, the notices of Dr. Mertens on the people, of Capt. Lütke, Kotzebue, and others, may be consulted with great interest on these and similar points.

WINDS.—The following account of the winds and currents is drawn from the remarks of Admiral Krusenstern:—The direction of the Caroline Archipelago, between the latitudes of 3° and 8° , is in the region of the N.E. trade-winds. But we learn from the relations of several navigators that the N.E. winds are *not* the prevailing winds, which are confirmed by the fact that the inhabitants of several of the western islands having been carried in their canoes towards the East and N.E., a proof that during a portion of the year the winds blow from the West. The Pelew Islands are, as is known, in the limits of the monsoons, which may extend to the meridian of the Mariane Islands, and even some degrees beyond that, up to the point where they are arrested by the regular trade-winds. This last part seems to be proved by the circumstance, that the inhabitants of the Carolines, who perform their annual voyages from Lamurek to Guahan, situated several degrees to the East of that island, generally embark, from what M. Chamisso states, in April, returning in May or June; that is, they start towards the termination of the eastern monsoon, probably that they may not have long to wait for the return of the westerly monsoon, with which they return in May or June, when this monsoon is found to be in its greatest strength. M. Chamisso

draws a conclusion from this opposite to that which M. Krusenstern does. He says that the islanders return in May or in June, *before* the westerly winds set in ; however, it is known that the westerly monsoon never comes later than the month of May.

The Island of Guahan, lying 7° farther North than the Ulea Islands, and the canoes leaving here being often thrown upon Guahan, also proves that the violent winds of this monsoon blow from S.W., and also, probably, S.S.W. and South. Besides this, it is still possible that there are frequent anomalies in the prevalent winds as in the trade-winds, many navigators having remarked northerly winds near the Pelew Islands, Yap, and the Matelotas, during the months of July and August. These changes in the course of the winds, when they occur suddenly and impetuously, are probably the cause of the boats overtaken by such winds being unable to bear up against them, and are carried towards the East and N.E.

It is more difficult to combine the causes which carried Kadu * from Ulea to the Radack Islands, lying at the distance of 450 leagues from Ulea, and forming the eastern limits of the Carolines. This is explained in some degree by the period of eight months which was occupied in making this passage ; probably he was surprised by bad weather from the West, which bore him to the East until he reached the region of the trade-winds. Arrived here, he was buffeted about for several months, from one side to the other, struggling against contrary winds from the East, until at last he arrived at Radack ; but that he should have been able to reach here, it must be imagined that in this region of the trade-winds westerly breezes may be met with, which proves the existence of anomalies so far to the East.

On the subject of currents, they have been found very violent to the South of the Pelew Islands, bearing to the East, at the rate of 2 or 3 miles an hour, particularly in the months of June, July, and August, that is, during the strength of the S.W. monsoon. In the memoir on the currents, mention is made of this current, which occupies a zone of 60 or 70 leagues in breadth, and extends from the Pelew Islands to the meridian of 148° or 150° E. longitude.†

The description of the archipelago begins with the easternmost, and proceeds in a westerly direction.

UALAN‡ or STRONG'S ISLAND.—This is the easternmost of the Caroline Islands, and was discovered, in 1804, by Capt. Crozer, commanding an American ship, who gave it the name of *Strongy*, after the governor of Massachusetts. A notice of this discovery subsequently appeared in the *Moniteur*, February 1, but it was not then placed on the charts. M. Buache communicated the notice to Capt. Duperrey at the time of his voyage, and that navigator sought for and found it in June, 1824, proving that Capt. Crozer's position was very exact. He passed ten days here, and made a minute survey of it. "The Island of Oualan," says Capt. Duperrey, "may at some future time become of great importance. Lying in the track of vessels going from Australia to China, it offers at the same

* See Krusenstern, *ante*.

† Krusenstern, *Mem.*, vol. II. pp. 359-60.

‡ "Capt. Duperrey writes *Oualan*, but we always heard it *Ualan* ; in this D'Urville accords with us."—*Lütke*. The reader will understand that this is the French orthography.

time good ports for carenage, abundance of water, and refreshments of different sorts."* The island was also visited by Capt. D'Urville and by Capt. Lütke, the latter giving the following account of it :—Ualan is 24 miles in circumference. It is of volcanic formation. A break between two masses of mountains, which extend across the island from West to East, divides it into two unequal parts, the southern portion being more than double the extent of the northern. On this northern portion is *Mount Buache*, so named by Duperrey, which is 1,914 feet according to Duperrey, or 2,160 feet according to Lütke, above the sea level. From its rounded summit it falls gradually on all sides. On the southern portion, *Mount Crozer*, 2,152 feet above the sea, was named after the discoverer of the island. Its crest extends from N.W. to S.E.; the North flank is very steep and rugged at its summit. In general this portion of the island has many peaks, both isolated and coupled in the form of asses' ears. One of these peaks, more remarkable for its regularly conical summit, and by its position in front of Coquille Harbour, was named the *Mertens' Monument* by Lütke, from his lamented naturalist.

The northern part of the island is surrounded by a coral reef, which, opening before the break between the mountains, forms a fort on each side of the island : that to the West is what Lütke used; that to the East is what the islanders call *Ninmolchon*, and Capt. Duperrey, *Lélé*,† from the name of the small island found in it. The southern part is surrounded by a chain of coral islets, connected by reefs, and forming on the side towards the island a shallow lagoon, through which this part of the island may be traversed. This chain is broken towards the southern point of the island, forming a small port, named by the French *Port Lottin*.

The shore, sheltered by the reef from the violence of the waves, is surrounded by a broad belt of mangroves and other shrubs, forming a thick wall of verdure, which at first pleases by its singularity, but the monotony of which soon fatigues the sight. This belt also, hiding the real shore, renders it difficult to determine the exact limits of the island, and also by its nature renders it constantly liable to change.

In general the whole island, from the sea to the mountain tops, with the exception of the highest and most peaked summits of Mount Crozer, is covered with a thick and almost impassable forest. In the neighbourhood of the houses, this wood consists of bread-fruit, cocoa-nut, bananas, and other fruit trees. The break or valley between the two ports is the only part by which you can pass from one side to the other. The distance is only $2\frac{1}{2}$ miles, but the road is unpleasant from the marshy pools, especially after rain.

Rivulets and water-courses are met with at every step. Their number, and the richness of the vegetation, attest the humidity of the climate, unusual in these latitudes. It did not, however, appear to be unhealthy. The villages are chiefly placed along the beaches, but are not much seen from seaward, as they are hidden by the coral islets and mangroves. They are all surrounded with stone walls, separating the properties. The number of inhabitants in the fifty small villages

* Voyage de la *Coquille*; et Observations sur l'île de Oualan ou Strong, par M. Lesson, médecin, &c.; Journal de Voyages, Mai, 1825.

† "The natives do not pronounce it Lélé, but Lella."—Lütke.

enumerated by Lütke amounted to 409 men and 301 women. Their habits, manners, and appearances are amply described by Lütke and Duperrey, to whose works the reader is referred.

PORT LELE', or *Pané Bay* of the natives, is where the chiefs and the major part of the population reside. It is the most spacious : but as it is on the eastern side of the island, and the prevalent winds are from the eastern quarter, it is not easy to leave it, the more so because there is no sounding in the entrance. This is the harbour usually resorted to by the American whalers.

COQUILLE HARBOUR, where Duperrey's vessel anchored, is on the western side of the island, which gives it a great advantage over Port Lele'. The sea is here as calm and tranquil as a mill-pond. The anchorage is excellent, and very tenacious, on a bottom of black mud, near to two small islets lying in the bottom of the harbour.

The Island of Ualan will serve as an excellent place for refreshment, and particularly for the whalers or vessels proceeding to China by the eastern route : a tranquil harbour, a fine climate, an abundance of fresh water and fruits, are great advantages, all to be enjoyed here.* An abundance of sea-provisions must not be expected here ; there is no fear of want for daily consumption.

The position of the N.E. islet in Coquille Harbour is lat. $5^{\circ} 21' 20''$, lon. $163^{\circ} 1' 0''$ E. Capt. Lütke makes the centre of the island in lat. $5^{\circ} 19' N.$, lon. $163^{\circ} 6' E.$ †

MAC ASKILL ISLANDS.—According to Arrowsmith's chart, Capt. Musgrave, in the ship *Sugar-cane*, discovered some small islands, in 1793. They were placed in lat. $6^{\circ} 12' N.$, lon. $159^{\circ} 15' E.$ According to Horsburgh, Capt. MacAskill, of the ship *Lady Barlow*, on her passage from Port Jackson to China, discovered, October 29, 1809, two islands covered with trees, extending about 3 leagues S.E. and N.W. By good observations the centre was found to be in lat. $6^{\circ} 12' N.$, lon. $160^{\circ} 53' E.$ ‡ Admiral Krusenstern applied the name of *Musgrave Islands* to the first discovery ; that of *MacAskill* was given to the second. Notwithstanding the difference of longitude (perhaps owing to the effect of currents), it cannot be doubted that they are the same. Capt. Duperrey places the southern one in lat. $6^{\circ} 13'$, lon. $160^{\circ} 47'$; the northern in lat. $6^{\circ} 12' 50''$, lon. $160^{\circ} 47' 20''$. Although they are placed on the charts under the name of MacAskill, if it should be proved that there is but one, that of Musgrave has the claim of priority.

The two islands are called *Takay* and *Pelelep*, and together are not more than $2\frac{1}{2}$ miles in extent. They are covered with cocoa-nut trees, are of coral formation, and connected by coral reefs, forming a lagoon inside, with a good ship passage through the reef on the West side leading into it. The group is about 15 miles in circumference, and is well inhabited by a light-complexioned race,

* A good supply of yams and fowls can be obtained from the natives. Two vessels were cut off some years ago ; but of late the natives have got the name of being friendly and hospitable. Strangers, however, should not allow too many of them on deck ; and have their boats armed when wooding and watering.—*Nautical Magazine*, Nov., 1848, p. 578.

† Vide *Voyage du Sténiafine*, tome i. p. 330, *et seq.* ; and M. A. Postels in ditto, tome iii. p. 94, *et seq.* ; and Dr. Mertens in ditto, p. 132 ; *Voyage de la Coquille* ; &c.

‡ East India Directory, vol. ii. p. 609.

who must not be trusted; they live chiefly on fish and cocoa-nuts. The reefs produce biche-de-mar.*

DUPERREY ISLES, a group of three coral islands, very close to each other, were discovered in *La Coquille*, June 18, 1824, and named after her commander. The three islands are named *Aoura*, *Ongaï*, and *Mougoul*. The N.E. point of *Aoura* is in lat. $6^{\circ} 41' 45''$ N., lon. $159^{\circ} 50'$ E. They occupy an extent of less than 10 miles, nearly North and South.

In the *Nautical Magazine* (1848, p. 578) they are called the *Wellington Isles*. They are covered with cocoa-nut trees, and are connected by coral reefs, forming a lagoon, with a passage on the N.W. side, leading to the lagoon. This group is thickly populated. The reefs produce biche-de-mar, and a good supply of cocoa-nuts may be obtained for trifles; but strangers touching here, or at *MacAskill Isles*, should be on their guard against treachery, as the natives are not to be trusted, no matter how friendly they appear.

SÉNIHAVINE ISLANDS.

This group, consisting of three separate groups, one of which contains the largest and highest island of the Carolines, it is very singular should be one of the latest discovered. It was first seen January 2, 1828, by Capt. Lütke, in the Russian corvette *Séniavine*, and was named after the officer whose name the vessel bore.

The *Séniavine Islands* lie between lat. $6^{\circ} 43'$ and $7^{\circ} 6'$ N., lon. 158° and $158\frac{1}{2}^{\circ}$ E. In the principal island the word *Pouynipète*,† or *Päinipète*, was constantly pronounced by the natives, and may be undoubtedly recognised as the *Faloupet* of *Père Cantova*; *Pouloupa*, of which the *Ougaï* islanders spoke to Capt. Duperrey; and *Fanopé*, mentioned by the natives of *Kadu* to *Kotzebue*.‡ By this latter name, or more correctly by that of *Faounoupei*, it is known throughout all the western groups of the Carolines.

It is nearly 50 miles in circumference. Its highest point, *Mount Monte-Santo*, so named in memory of the naval victory gained over the Turks by Admiral *Séniavine*, is 2,858 feet (English) above the level of the sea.

On its N.W. portion is a spot that is entirely flat, from which the land rapidly falls towards the N.W. point of the island, *Cape Zavalichine*, named from Lütke's officer. This is remarkable for a rock about 1,000 feet in height, nearly perpendicular, and which seems to be of basalt. In other directions the land slopes gradually from the summit to the shore. On the South side is an isolated and very distinct mass of basalt, which, seen from East or West, exactly resembles a lighthouse or a sentry box.

From what could be judged of the principal geological formation of the island from what was seen, it is, like all the other high islands of this sea, of basalt. It is, like those, surrounded by a coral reef, on which some islands, of different

* Voyage de la *Coquille*; Krusenstern, vol. ii. p. 347, and Supplement, p. 147; *Nautical Magazine*, 1848, p. 578.

† "The first syllable of this word cannot be exactly rendered; it has, in the lips of the natives, a strange and savage sound, extremely difficult to pronounce, and disagreeable to the ear."—Lütke.

‡ Voyage of the *Rurick*, vol. iii., by Dr. Chamisso.

sizes, also of coral, are dispersed ; but in Unwelcome Port, and a little farther to the East, there are, even close to the shore, some high islands. Some of these are thickly wooded and inhabited. The island is entirely covered with verdure ; but it seems less thickly so than Ualan. To leeward, that is, on the South and West sides, mangroves and other shrubs grow in the water, forming an impenetrable border.

There are but very few habitations seen near the sea-shore ; the greater part are hidden by the trees, but the smoke rising in numerous points, and the large clumps of cocoa-nut trees, attest the numerous population.

The Pouynipètes differ strikingly from the natives of Ualan, and also from the rest of the Carolinians. These approach much nearer in appearance to the Papuas. When Lütke touched here he was received in a very troublesome manner by them, and consequently had not many opportunities of examining closely their habits and capabilities. The same reason prevented him from making a minute exploration of the nature of its harbours and resources. Since that time it has been visited by whalers and other traders, and a good account of this, as well as of others of the Caroline groups, is given in the *Nautical Magazine* for 1848 and 1849, by the commander of the ship *Naiad*. The author's name is not given ; it is to be regretted that the charts he used did not show the present state of our knowledge of the archipelago ; this would have much assisted in the subsequent descriptions.

The whole island is thickly wooded, and produces many varieties of good timber, fit for house, ship-building, and other purposes. The shores are fronted with mangrove trees, growing in the salt water, which form an impenetrable barrier to boats landing, except in the rivers, and other small canals or channels, formed amongst them by nature. Many of these are so narrow as scarcely to admit of oars being used ; they answer every purpose however, as all the houses situated near the shore have generally one of these channels leading to them.

The soil is composed of a rich red and black loam, and would, if properly cultivated, produce every variety of tropical fruits and esculent roots, together with coffee, arrow-root, and sugar-cane. The trees do not branch out until near the top ; the trunks of many of them are covered with climbing plants and vines, and the lower part of the trunks enveloped with ferns, of which there are many varieties ; these give the ground a matted or woven appearance. The woods throughout the island are very thick, and often composed of large and fine trees ; among them are tree-ferns, banyan, pandanus, and several species of palms. The sassafras tree is also found here.

Many beautiful sweet-scented white and yellow flowers are to be found. These are much esteemed by the natives, and are strung into wreaths, which both sexes wear round their hair at feasts, and on other occasions. These wreaths are exceedingly handsome.

The bread-fruit tree is very abundant, and grows here to a large size. The cocoa-nut and wild orange are also found in great numbers. A small species of cane or bamboo is very common, and is used for making floors and side wicker work for the houses. Wild ginger and arrow-root also abound. The cultivated plants and trees are bread-fruit, of which they have many varieties ; cocoa-nut,

ti-root, taro, bananas, tacca, from which arrow-root is made ; sugar-cane, which is used only for chewing ; yams, sweet potatoes, pumpkins, tobacco, in small quantities, and kava (*Piper mythisticum*). The latter is cultivated to a large extent throughout the island, and daily used at their feasts.

They pay very little attention to the cultivation of arrow-root ; yet what I have seen made from the root appeared to be of a very superior quality.

Yams are plentiful all over the island, but whalers get their supplies chiefly from the North side, where they are cultivated to a much greater extent than at any other place ; they are, however, of rather a small size, and of an indifferent quality, through not being properly attended to. The cultivated ground does not extend far from the coasts, near which all the villages are situated.

There are no inhabitants inland, and few of the natives have ever visited the centre of the island. There are no traces of any native quadruped, except rats. The flying fox, or vampire bat, is very plentiful, and very destructive to the bread-fruit. Wild pigeons abound all over the island. They appear to be in best condition, and most plentiful, from December till April.

A vessel recruiting here may obtain a daily supply of them for all hands, by giving a couple of native boys fowling-pieces, with ammunition. These youths are excellent shots, and in half a day will procure a sufficiency for a whole ship's crew. No fear need be entertained of their stealing the fowling-pieces, as I have never heard an instance of it during my many visits to this island. A fig of tobacco each will sufficiently remunerate them for their labour ; and numbers will be found daily volunteering their services. Poultry is plentiful all over the island. The usual price of one dozen fowls is twenty-four figs of negro-head tobacco, or two fathoms of cheap calico. Yams can be purchased from the natives for ten figs of tobacco per hundred ; bread-fruit, ten figs per hundred ; cocoa-nuts, the same ; bananas, two figs per bunch ; and all other productions of the island at an equally low rate. Fish are taken on the reefs in great abundance and variety. Mulletts are very numerous, and are frequently seen leaping from the water in immense shoals. The small fish are chiefly caught in hand-nets, and the others in various other modes.

These islands furnish abundant supplies for the refreshment of whalers ; but as yet there are few articles which can be made available in commerce. The islands produce about 500 lbs. of tortoise-shell annually ; the whole of which is purchased from the natives, at a very low rate, by the Europeans living on the island, and sold by them to whale-ships, at an advance of 500 per cent. ! They take their payment chiefly in spirits, tobacco, muskets, and gunpowder. The introduction of these articles, and their abuse by the vagabonds on shore, have tended to demoralize the natives.

This is the only article of merchandize which can be, at present, procured (except biche-de-mar) beyond the immediate wants of the visitors. Ginger, arrow-root, sassafras, coffee, sugar, and many species of excellent timber, might, however, be easily added to the list of exports.

Whalers procure annually about fifty tons of yams, and abundance of bananas, bread-fruit, and poultry. Figs are only to be obtained from the Europeans. The natives reared them formerly, but, through being too lazy to fence in their planta-

tions, they ultimately killed them all, and substituted dogs as an article of diet instead.

Near Matalanien Harbour are some interesting ruins, which are, however, involved in obscurity; the oldest inhabitants being ignorant of their origin, and having no tradition bearing any reference to their history. That a fortified town once stood upon this spot, and not built by savages, cannot be doubted; the style of the ruins giving strong proofs of civilization. Some of the stones measure 8 to 10 feet in length, are squared on six sides, and have evidently been brought thither from some civilized country, there being no stones on the island similar to them. Streets are formed in several places, and the whole town appears to have been a succession of fortified houses. Several artificial caves were also discovered within the fortifications.

This town was, doubtless, at one time, the stronghold of pirates, and as the natives can give no account of it, it seems probable that it was built by Spanish bucaniers, some two or three centuries ago. This supposition is confirmed by the fact that, about three or four years ago, a small brass cannon was found on one of the mountains, and taken away by H.M.S. *Larne*. Several clear places are also to be seen a little inland, at different parts of the island; some of which are many acres in extent, clear of timber, and perfectly level. Upon one of these plains, called K-par, near Roan Kiddi Harbour (and which I have frequently visited), is a large mound, about 20 feet wide, 8 feet high, and a quarter of a mile in length. This must evidently have been thrown up for defence, or as a burial-place for the dead, after some great battle.

Similar ruins are to be found at Strong Island, of which the natives can give no account.*

Of its harbours Capt. Lütke has given us no account, as before stated. He sent Lieutenant Zavalichine, January 3, 1828, to examine one at the South end of the island, in an opening of the reef, and leading towards what is marked on his chart as *Mounts Tenedos* and *La Guérite* (the sentry box), before alluded to. This entrance is in lat. $6^{\circ} 41' N.$, lon. $158^{\circ} 24' E.$ † According to the commander of the *Naiad*, it is called *Roan Kiddi Harbour*; according to the officers of H.M.S. *Larne*, it is called *Kittie Harbour*. The following observations are by the commander of the *Naiad*.

The HARBOUR of ROAN KIDDI is situated in lat. $6^{\circ} 49' N.$, lon. $158^{\circ} 11' E.$ This longitude may be considered nearly correct, being the mean of many chronometrical admeasurements from places whose positions have been well determined.

A vessel bound to this harbour from the eastward, from December till April, should endeavour to get into the latitude of the island as soon as possible, after passing the Duperrey Isles, and continue running to the westward on the same parallel of latitude, until the island is sighted, as strong westerly currents prevail at times during these months, with much hazy weather; and a stranger would be liable to get set past the island, if a proper allowance were not made

* Nautical Magazine, Nov., 1848, pp. 642—644, and Dec., pp. 580-1.

† Voyage du *Séniavine*, tome II. p. 7.

for the current. After making the land, continue steering to the westward, until the reef is visible from the deck; at which time, if the weather be moderate, it is presumed a pilot will be alongside. Should no pilot, however, make his appearance, the entrance to Roan Kiddi Harbour may be known by attending to the following directions :—

Stand boldly in, until within one-quarter of a mile of the reef, then steer to the south-westward, keeping along the edge of the reef at about the same distance off. When the centre of Bornabi bears about N.W., a vessel will be abreast of two or three small islets, situated on the margin of the reef, which will then be found to trend more to the westward; and, shortly after passing these islets, the course along the reef will be found to be W. by S. or W. Two small islands will then be seen ahead, or a little on the starboard bow, which are called by the natives *Narlop*, or *Naalap*: they bound the entrance to the harbour on the west side; and a sand-bank, with a few bushes upon it (situated on the edge of the reef, and bearing about E.N.E., a quarter of a mile from Naalap), forms the eastern boundary of the channel; the entrance to the harbour being between Naalap and the sand-bank.

On passing the sand-bank, give it a berth of about a cable's length, then haul more up, and keep the reef on the starboard hand (which will be seen from the mast-head), close aboard on running in. The channel now becomes contracted by two sunken rocks, which must be left on the larboard hand. The course from the sand-bank, to pass between these rocks and the reef, on the starboard side, is about N.W. by W. $\frac{1}{2}$ W. The narrowest part of the passage is on passing the inner rock, the channel at that place being only 40 fathoms wide. This forms the entrance to the basin or harbour, and a vessel must now haul her wind, and steer N. by W. $\frac{1}{2}$ W., which is the mid-channel course from the inner rock to the anchorage, near the head of the basin. The best anchorage is in about 7 or 8 fathoms, muddy bottom, where a vessel will lie completely land-locked, and perfectly safe from all winds.

Roan Kiddi River is about a quarter of a mile from the anchorage, from whence a plentiful supply of good fresh water can always be procured, and an abundance of firewood can be easily obtained on the low land, at the mouth of the river. It is high water at this place on full and change of the moon at 4^h; rise and fall, 5 $\frac{1}{2}$ feet. A stranger before attempting to enter this harbour will require to send a boat in, and place buoys on the rocks and East side of the channel.

By having a careful officer at the mast-head, when running in, all dangers can be seen and avoided in a clear day. The best time to enter this harbour is on the first of the flood; as, should a vessel unfortunately get on shore, through a sudden shift of wind, while passing the narrows, she will stand a much better chance of getting off without injury than at any other time.

The ensuing remarks are from the remark-book of H.M.S. *Larne*, 1839 :—

“After passing an outer bight or bay, formed by the outer reefs, in which there is nothing less than 45 fathoms, a N.W. course leads for the inner passage, which, for about 200 yards, is 80 yards wide between a sunken rock, with 4 feet on it on the larboard hand, and the line of the inner reef very

steep-to (7 fathoms), which should be hugged as closely as possible. The course through the narrow is N.W. by W.; but a fixed course or marks are unnecessary, as a ship would always pass in and out as the *Larne* did by the deep water, as distinguished by the eye when conned from the fore-top-gallant mast-head. The ordinary N.E. trade is a leading wind in, with very smooth water, and when through the narrow, it is requisite, if possible, to shoot to starboard round the tongue of the reef, clewing all up, and anchor in 22 fathoms. Then warp to northward up the pool to any depth, from 20 to 7 fathoms, which it is best to do evening or morning when the wind drops.

"At the *Larne's* anchorage we found the lat. $6^{\circ} 48' N.$, and lon. $158^{\circ} 26' E.$; variation, $9^{\circ} 45' E.$; high water (full and change), 6^h ; rise and fall, $4\frac{1}{2}$ feet."

This anchorage was surveyed by Lieutenant G. S. Reynolds and Mr. R. Edwards (mate), of H.M.S. *Larne*, and a plan of it forwarded to Rear-Admiral Sir F. Maitland, at Trincomalee, August 29, 1839. It is a perfect pool, with strong clay holding ground. To the northward a fine stream of fresh water discharges itself, which can only be entered by boats an hour before and after high water, with just sufficient breadth to ply the oars. The best place for filling is about half a mile up the stream, near a hut where the natives make nets and repair canoes. Just above this spot the clear fresh water descends in a torrent.

"We obtained some pigs from Europeans, who had introduced the breed, and a few yams. No poultry of any sort to be had. Some good fish were caught. The whole island abounds with cocoa-nuts, and the bread-fruit in great variety, on which the natives subsist. We were foiled for a day or two in moving from this place, owing to the wind drawing unusually eastward."

The other port is on the North side of the island. Before the N.W. point of the island, remarkable for the high basaltic rock, we saw a large opening in the reef, and beyond that an extent of water which promised a good harbour. I determined once more to find a convenient anchorage. Our boats found a passage $2\frac{1}{2}$ cables' length in width, and 25 fathoms in depth, and beyond that, to all appearance, an extensive and safe harbour. But hardly had they passed the entrance channel, before they were met by canoes full of natives, who surrounded them in an instant in a most turbulent manner. Rather than come to extremities with them, the boats returned to the corvette. It is possible that these natives had no hostile intentions, but their conduct was such that the search was given over.* This harbour is called *Unwelcome Harbour* (Port du Mauvais Accueil) by Capt. Lütke, from his reception of the inhabitants.

METALANIEN HARBOUR is on the N.E. of the island. The anchorage at Metalanien Harbour is perfectly safe, and sheltered from all winds. This harbour has a wide entrance on the North side of the Island of Naa, and the only hidden danger to be avoided when running in is a sunken rock, some distance within the entrance, and which lies nearly in mid-channel. The sea sometimes breaks on it; but it can always be avoided by keeping the starboard side of the channel close aboard. The barrier reef at this place extends a long distance from the main land, and between which are many coral flats, with deep-water channels

* Capt. Lütke, vol. II. p. 15.

amongst them in some places. The harbour is formed by the main land, and is similar in shape to a horse-shoe; and the channel through the reefs which leads to it runs nearly in a direct line from the entrance in the barrier reef to the heads of the harbour.

This harbour may be easily known to vessels standing in from sea, by a remarkable peaked hill, resembling a spire or sugar-loaf, which is situated on the North shore, within the harbour. The channel leading to this harbour lies in a S.W. and N.E. direction. An abundant supply of firewood and excellent fresh water can always be obtained at this place.

Strong N.E. winds prevail from December till April, with much hazy weather and frequent squalls, attended with rain. During these months strong westerly currents are very frequently experienced. From March to August the winds are generally light and variable, but chiefly from the eastward, with much fine weather.

In September, October, and November, strong westerly winds, with severe squalls and rain, may be expected; and strong easterly currents are frequently found during these months. On the whole, the climate must be considered very moist, as scarcely a day passes without rain, especially in the winter months. These continual showers produce rapid vegetation, and keep up a constant run of fresh water from the mountains in the chasms and rivulets between the hills.

The officers of H.M.S. *Larne* make the following observations on this harbour:—It is highly advisable that no square-rigged vessels of any magnitude should enter this harbour. The passage is narrow, with two rocks in it at different angles, and as it fronts directly to the N.E., from whence the trade-wind is perpetually blowing, a heavy swell rolls in incessantly, and there being no soundings *without* the reef, it is dangerous in beating out in case of the wind dropping, and boats are useless for towing on account of the heavy swell. It was entirely owing to these circumstances that the *Falcon* of London (whaler), was wrecked in her attempt to beat out in July, 1836, after having been three months wind-bound inside.

The ANDEMA GROUP is the second cluster attached to the Sériavine Islands. They lie to the S.W. of Pouynipète, and their nearest points are about 7 miles distant from each other. This is the same group that was said to be discovered by Capt. Fraser, of the ship *Planter*, in 1832, and named by him *William the Fourth Group*, and in some charts, *Fraser Islands*. But the discovery in the Sériavine being prior to this, of course the credit is due to Capt. Lütke. When first approaching it, January 5, 1828, he was nearly being drifted on to them by a calm which overtook him; this was caused by the high land of Pouynipète interrupting the trade-wind, but did not prevent the heavy swell from rolling onwards. This incident may serve as a caution. He says that the group is composed of a dozen coral islands of different sizes, covered with a thick verdure. There was no appearance of habitation, but they were visited at times, for they saw in one part a pile of stones raised on a large blackish rock. The reef is of a triangular form, and is about 8 miles long on each side, the islands occupying that facing the S.E. The South extreme is in lat. $6^{\circ} 43' 10''$ N., lon. $158^{\circ} 5' 30''$ E.

The commander of the *Naiad* calls them the *Ant Islands*, and says they form a group of four large, low, coral islands, covered with cocoa-nut and bread-fruit trees, and surrounded by a coral reef, forming a lagoon inside, with a passage leading in to it, between the two large islands on the East side of the group.

These islands belong to the chiefs near Roan Kiddi Harbour. They have no permanent inhabitants, but are resorted to from May till September, for the hawk-bill turtle fishery. They are also visited at other times for supplies of cocoa-nut and bread-fruit.

THE PAGUENEMA GROUP is the third and westernmost of the Sériavine Islands. It is composed of five small islands lying in a N.W. and S.E. direction, and extending about 5 miles in length. The S.E. island is named *Katolina*, and its East point is in lat. $7^{\circ} 2' N.$, lon. $168^{\circ} 0' 30'' E.$ The next lies $1\frac{1}{2}$ miles to the northward of it, and is called *Ta*; the next is *Tagaik*, lat. $7^{\circ} 4' 4'' N.$, lon. $167^{\circ} 58'.$ *Kapenoar*, or *Kapenuare*, is the westernmost. Its West point is in lat. $7^{\circ} 4' 40''$, lon. $167^{\circ} 56' 30'' E.$ This is the largest island. In the Nautical Magazine they are called *Pakeen*, and the following is the account of the group:—

It is composed of five small islands surrounded by a coral reef, forming a lagoon inside, into which there is no passage through the reef. The westernmost island is inhabited by a Pouynipète chief, his family and servants, in all about thirty souls; and this chief claims sovereignty over the whole of this group. The islands are very low, of coral formation, and produce abundance of cocoa-nuts and bread-fruit, and the lagoon plenty of excellent fish to supply the wants of the inhabitants. The group is about 5 miles in length from East to West, and about 3 miles in breadth from North to South.

This place is celebrated for its canoe sails, which are manufactured from the leaves of the pandanus tree, and which are eagerly sought after by the natives of Pouynipète. Poultry are also plentiful in this group. In fine weather the natives frequently visit Pouynipète in their canoes, for the purpose of obtaining tobacco and other foreign commodities (November, 1848).

NGARYK, or VALIENTES ISLANDS, a small group of eight coral islands, the East extreme of which is in lat. $5^{\circ} 47' 30'' N.$, and lon. $157^{\circ} 32' E.$ They were discovered, in 1773, by the Spanish navigator, Don Felipe Tompson, who called them *Los Valientes*. He made a plan of them, which was found by Capt. Lütke to be tolerably accurate, but $1^{\circ} 4'$ too far East. They were seen, in 1793, by Capt. Musgrave, in the *Sugar-cane*, who called them the *Seven Islands*; and in the year following they were passed by the *Britannia*, and named the *Raven Islands*. Capt. Don Joachim Lafta saw them, and determined their position in 1802. They were surveyed, in 1828, by Capt. Lütke, whose account follows:—

The Ngaryk or *Ngaruik* group is of a triangular form, and is 22 miles in circumference. We counted *eight* islands, and not seven as is marked on Tompson's plan. We found a continuous reef surrounding the whole of the group, without having the least passage into the lagoon. It would be curious to know if Tompson was mistaken in marking an opening on the South side by which the natives passed in their canoes, or whether this opening has become closed in the course of fifty-five years by the zoophyte architects. On all the islands a large quantity of cocoa-nut trees grow. The South side of the northern-

most island is quite covered with a forest of these trees. Notwithstanding this, we saw no traces of inhabitants except on the small island at the western angle. Thompson saw people on the eastern islet, and canoes in the lagoon. We were surprised at the entire absence of the latter. This was more strange, as a large quantity of bread-fruit trees, from which they make their canoes, were seen; and besides this, a large quantity of driftwood lay on the shore. The population must be very slight. It was supposed that the thirty men seen together on the westernmost island formed the entire population.*

NOUGOUORE, or MONTEVERDE ISLANDS.—This group, which lies considerably to the South of the general line of the Caroline Archipelago, was discovered by Don Juan Bapt. Monteverde, commanding the Spanish frigate *La Pala*, February 18, 1806. He places them in lat. $3^{\circ} 27' N.$, lon. $155^{\circ} 48' E.$ The first or native name is that applied to them by Capt. Lütke, though he did not see them. Capt. Morrell, whose amusing but glossed narrative we have before quoted, gives the only account of them.

The group is nearly circular, and contains about thirty islands, the largest being not more than 10 miles in circumference. They are all surrounded by a coral reef, upon the edge of which the islands stand, with boat passages between, leaving a lagoon of 7 leagues in length from N.E. to S.W., and about 5 leagues from N.W. to S.E.

The bottom of this lagoon is literally covered with pearl-oyster (?) in a depth of 3 to 20 fathoms, and the surrounding reef abounds with biche-de-mar of a superior quality. The hawks-bill turtle also frequent its shores in the season.

These islands are all very low, the most elevated points of them not rising more than 100 feet above the level of the sea.† The surface of each is literally covered with cocoa-nut, bread-fruit, and palm trees, besides many other kinds of wood that are highly useful to the islanders in the construction of their canoes, houses, and war implements.

The natives are tall, well made, robust, and active. When they approached the *Antarctic*, Morrell's vessel, they gave the crew cocoa-nuts, &c., without asking for return, but a little liberality soon stripped them of all their property in exchange. On their returning to the island they made evident preparations for an attack, which treachery Morrell avoided by sailing off.‡

BORDELAISE ISLAND and REEF, a small, low, coral island, 2 miles long and about 60 feet high, with a reef projecting from it to the S.E. for 15 miles, was discovered, in 1826, by Capt. Saliz, commanding *Le Péruvien* of Bordeaux.§ The reef forms a lagoon inside it, and from its S.E. part the island cannot be seen. The island is in about lat. $7^{\circ} 39' N.$, lon. $155^{\circ} 5' E.$

Several discoveries have been stated to be made in this immediate neighbourhood. *Jane Island*, by Capt. Johnson, of the ship *Guilford*, in October, 1827, in lat. $7^{\circ} 33' N.$, lon. $155^{\circ} 3'.$ His description, which accords very nearly with that of Capt. Saliz, is that of a small low island, half a mile in length, with

* Voyage du *Séniavine*, tome ii. pp. 37-8.

† This must refer to the height of the trees upon them.

‡ Narrative of Four Voyages, &c., pp. 392-3.

§ Annales Maritimes, &c., pour l'An 1827.

a very dangerous reef running off the S.E. extreme of the island to the distance of 5 miles, and a chain of rocks extending to the E.S.E., as far as could be seen from the mast-head. The S.W. point of the island only was seen.

Larkins Reef, or *Campbell's Reef*, a dangerous reef discovered by Capt. W. Campbell of the ship *Larkins*, February 23, 1830. The N.E. point is placed in lat. $7^{\circ} 36' N.$, lon. $155^{\circ} 10' E.$ He did not see the small island, but says it is 14 miles E.S.E. of Bordelaise Island.* *Meaburn Island* on Norie's Chart, in lat. $7^{\circ} 49'$, lon. $155^{\circ} 20'$, must be the same. *San Agustino Island* and *Bazo Trista*, discovered by Don F. Tompson, which, though placed by him 2° to the East, would appear to be the same; more particularly, as, should the position have been correct, he would have been within sight of the high S niavine Islands. L tke discovered an error of $1^{\circ} 4'$ in the longitude of Los Valientes, which would reduce the discrepancies to 1° , which Admiral Krusenstern considers ought not to be considered as decisive. Although his opinion is that all these are identical, still San Agustino Island may be placed as doubtful.†

Bordelaise Island, therefore, it is very probable, is the only island. It is covered with bushes and palm trees, and can only be seen 10 or 12 miles. A M. Edw. du Pernet, master of an Oahu schooner, was wrecked on its reef in 1843, and remained on the islet five months, during which time they built a small craft which carried them safe to Guam. He was pretty certain that no other island existed near it.‡

DUNKIN'S REEF, seen by the person whose name it bears in 1824, is marked as an extensive shoal, the South end of which is in lat. $9^{\circ} 50' N.$, lon. $154^{\circ} 10' E.$ It may be the same as *Orouloug Group*, which Capt. L tke heard existed to the East of the Hall Islands, being one of three, Orouloug, Mourileu, and Falalou, the two last of which he visited.

RAPHAEL ISLAND is a small island in lat. $7^{\circ} 18' N.$, lon. $153^{\circ} 54' E.$, discovered by Capt. Monteverde in 1806, and was thus named by Duperrey.

LOUASAPPE or D'URVILLE ISLAND.—This is a small island discovered by Capt. Duperrey, in lat. $7^{\circ} 3' 40'' N.$, lon. $152^{\circ} 42' 20'' E.$ In the second volume of Admiral Krusenstern's Memoir (p. 347) it is called *Duperrey's Island*, but this was before the publication of that commander's voyage. They are called the *Westervelts Islands* by Morrell, who believed them to be a new discovery, February 23, 1830. He says they seem to be composed of three small low islands, of nearly equal size, connected by a coral reef. They are well wooded with coconut and bread-fruit trees. They were neither of them more than 5 miles in circumference, and had biche-de-mar and pearl-oysters on the reefs.§

The MORTLOCK ISLES were discovered, November 29, 1793, by Capt. James Mortlock, commanding the ship *Young William*. Admiral Krusenstern applied the name of the discoverer to them, while on other charts the name of his vessel is given. Mortlock only saw their South side, and consequently gained a very imperfect notion of them. This is obviated by the examination made by Capt. L tke, who gives the ensuing account.

* Journal of the Royal Geographical Society, vol. i p. 255.

† Krusenstern, vol. ii. p. 346, and Supp. pp. 143-4.

‡ Naut. Mag., Jan. 1849, pp. 22-3.

§ Narrative of Four Voyages, p. 376.

Between the lat. of $5^{\circ} 17'$, and $5^{\circ} 37' N.$, lon. $153^{\circ} 59'$, and $153^{\circ} 37' E.$, are three low coral groups, on which may be reckoned ninety islets of various dimensions. The easternmost of these groups, *Lougounor*, is of an oval form, and 18 miles in circuit. *Lougounor Island*, at the eastern angle of this group, is carved into the form of a horse-shoe, and forms an excellent port, which was named Chamisso, in honour of the naturalist who gave to the world the first notions worthy of credit on this archipelago. The breadth of the island is from half a verst (one-third of a mile) to 150 paces. Its middle, raised about 7 feet above the water level, is covered with bread-fruit trees, and on the shores particularly, cocoa-nut and other trees, the fruit on the top of which frequently hangs down to the water of the interior lagoon. The southern part of the island is sandy, but towards the North there is much vegetable mould, on which are distributed the arum plantations, which require a very humid soil, and near to which are all the habitations of the natives. These plantations are intersected by narrow channels, which conduct the water to irrigate all parts, and serve as boundary marks. The woods which surround them form a magnificent panorama, where plants of every species are in infinite variety, giving the most excellent idea of the productions of these low islands.

The island naturally has no fresh water, but the rain water is collected in trenches and in a sort of reservoir, which the natives excavate in the trunks of those cocoa-nut trees that were inclined. The water in the trenches was always found to be brackish and smell bad. This slight resource suffices for the inhabitants, inasmuch as they drink but little, and the cocoa-nut supplies the deficiencies by its delicious contents.

The Lougounorians were found by Capt. Lütke to be hospitable, kind, reserved, and of agreeable manners. They are above the middle size; they had apparently had some communication with shipping previously, either by report or otherwise. Their canoes, in which they pass a considerable portion of their lives, are constructed with infinite pains, and are very carefully preserved, the larger ones on shore; and in their management they show great skill and judgment in the very long voyages which they undertake by these means. These islanders are the easternmost of the Caroline natives who thus travel.

Lougounor offers no more resources than any other of the low coral islands. The supply of fresh water depends on the abundance or scarcity of the rains. There is no wood. A good supply of cocoa-nuts may be looked for; bread-fruit can only be had in the season. Some poultry and pigeons were also procured. Port Chamisso is in lat. $5^{\circ} 29' 20'' N.$, lon. $153^{\circ} 38' E.$

The SOTOANE GROUP lies to the S.W. of Lougounor. It is 17 miles in length from N.W. to S.E., and 12 miles broad. About sixty islets were counted on it. In two places openings in the reef were observed, by means of which, doubtless, an entrance into the lagoon might be effected. All the islets are covered with wood, but it appeared to be less populous than Lougounor. Only two or three canoes approached the *Séniavine*, but no communication was held with them.

The ship *Naiad* visited the islands in October, 1844. They found a good passage through the reef, on the S.W. part of the group, and anchorage in the lagoon, near the entrance, but the bottom was very uneven and rocky. The

Naiad anchored in 25 fathoms, about three-quarters of a mile to the northward of the entrance, inside of a small islet bearing S.W. from her one-quarter of a mile, and lay there three weeks, during which time they built a biche-de-mar house on the small island, but could not get the natives to collect the slug, and consequently were obliged to leave. "This group is thickly populated by a light complexioned and able-bodied race, who are excessively lazy and unwilling to work, and who would not hesitate to cut off a vessel, provided they had a fair opportunity. Vessels touching here should always be on their guard, and not allow any of the natives on deck." *

The ETAL GROUP is the third and northernmost of the Mortlock Isles; it is a small group, not more than 6 miles in circumference, and composed of four islets; the inhabitants do not differ in anything from the Lougounorians.†

The NAMOLOUK GROUP lies 35 miles to the N.W. of Lougounor. In coming from the North the *Séniavine* passed them, at the distance of less than 12 miles, which shows how readily these islands may be unnoticed even within such a distance. It is the same group that Capt. Morrell saw, May 14, 1830, and supposing it to be a new discovery, called it *Skiddy's Group*. He says it consists of three small low islands, each from 3 to 5 miles in circumference, and almost entirely covered with cocoa-nut and bread-fruit trees. They were well inhabited, and are all surrounded and connected with a coral reef, which furnishes biche-de-mar, pearl, and pearl-oyster shells. They extend about 10 miles East and West, and about 5 miles North and South. They were also probably seen by Capt. Harwood, in the ship *Hastings*. They are the same as the *Hashmy Islands*, announced as being very populous in the Sydney Herald, March 25, 1833. The commander of the *Naiad* says they are five in number, the group 15 miles in circumference, of a circular form, and that the reef may be approached within 200 yards, as no hidden dangers exist. The natives, he says, though wearing the mask of friendship, are by no means to be trusted.

Capt. Lütke, the real discoverer, places the N.W. isle in lat. $5^{\circ} 55' N.$, lon. $153^{\circ} 13\frac{1}{2}' E.$ ‡

HOGOLEU ISLANDS.—This group, one of the most extensive in the Caroline Archipelago, was discovered by Capt. Duperrey, June 24, 1824. His survey, published on a large scale in the atlas of his voyage, comprises almost the sum of our knowledge of them, as the relation of his voyage, as far as concerns this part of the Pacific, has not been published. According to the chart, the northernmost of the group, *Pise Island*, is in lat. $7^{\circ} 42' 30''$, lon. $151^{\circ} 49' 15''$; the southernmost, *Givry Island*, in lat. $7^{\circ} 9'$, lon. $151^{\circ} 51' 45''$; *Torres Island*, the westernmost, in lat. $7^{\circ} 20'$, lon. $151^{\circ} 28'$; and the easternmost, in lat. $7^{\circ} 33'$, lon. $151^{\circ} 59'$. The largest of them, *Tol*, is not more than 10 miles in circumference.

They are the *Bergh's Group* of Capt. Morrell, who supposed them to be a new discovery, February, 1830. With his usual magniloquence he describes them as a picture of paradise, a group of beautiful islands locked up in a coral wall,

* Naut. Mag., Jan. 1840, p. 23.

† Voyage du *Séniavine*, tome ii. pp. 40, 87; see also Morrell's Narrative, pp. 380-90.

‡ Voyage du *Séniavine*, tome ii. p. 91; Narrative of Four Voyages, pp. 888-9

150 miles in circumference. In circumnavigating it, he states that he counted more than seventy islands, from 1 to 5 miles apart, the whole clothed with cocoa-nut trees and the richest verdure. The smaller islands on the circumference surround several larger ones moderately elevated, four of which are about 30 miles in circuit. There are four entrances to these inner islands through the outer reef; one on the N.W. side, one on the S.W., one on the South, and another on the East. Morrell's ship, the *Antarctic*, entered at the S.W. opening. The commander of the *Naiad* says that there are *many* good ship passages instead of four, as Morrell states. Only the interior islands are inhabited, and this by two distinct peoples, amounting, as Morrell says, to 35,000 in number; the two westernmost principal islands by a copper-coloured race, while the two easternmost with their dependencies contain a race more allied to the negro (Papuas); the latter are the most numerous, and the two races make frequent war on each other. He gives a glowing picture of these races. The lighter-coloured people must be models of humanity, if all their virtues and domestic characteristics are as genuine as Morrell relates them, but unfortunately it is not correct. The brig *Naiad* and *Will-o'-the-Wisp* came here in October, 1844, to collect biche-de-mar, and were completely taken off their guard by the apparent friendliness of the natives, who at first assisted them to build their curing houses. As soon as the brig left, they attacked the schooner with a force of 2,000 men, and were only repulsed with desperate fighting, and the loss of six killed, and five wounded. They also seized the long-boat, which was recovered the same day, and a severe drubbing administered. They had a great number of large Spanish knives, and were armed with brass-hilted cutlasses.*

HALL ISLANDS.—In the relation of the voyages of Capt. Saliz in the French ship *Le Peruvien*, 1825-27, it is stated that this group was discovered by an English commander named *Hall*, and that it consisted of two groups, separated by a channel, which was named after his vessel, *Lady Blackwood Passage*.

Capt. Lütke examined it in detail, and describes it in his narrative.

The **MOURILEU GROUP**, which lies to the N.E., is composed of nine islands, the principal of which are *Mourileu*, *Roud*, and *Namourousse*. The reef which surrounds them is of an irregular form. On the leeward side it is for the most part submerged, and cannot be distinguished but by the greenness of the water. Should a vessel fall on this by night, there can be but very little hope for safety. On the South coast of Rouâ there is a passage, even for large ships, which renders it probable that anchorage would be found in the lagoon. The inhabitants only occupy the windward islands, and do not go to the S.W. angle of the group, except for the purposes of fishing.

The **FANANOU GROUP** has also the general name of *Namolipiafan*. It is 40 miles in circumference, and encloses thirteen islands, the principal of which are *Ikop*, *Fananou*, and *Namouïne*. These islands, as well as those which compose the Mourileu group, are very small, the largest not being more than two-thirds of a mile long. The rest of the space is occupied by the reef, which is not less

* Nautical Magazine, January, 1849, p. 25.

dangerous here than that of Mourileu. The entrance to the lagoon is on the South side.

Capt. Lütke took off a sailor, William Floyd, who had been left here by a whale ship, and from whom he gathered some particulars of the archipelago.*

Mourileu, or, as it is spelt in the chart, Mourilleu, the northernmost island, is in lat. $8^{\circ} 47' 30''$ N., lon. $152^{\circ} 20'$ E. Namouïne, or Namouyne, the southernmost, is in lat. $8^{\circ} 30'$ N., lon. $151^{\circ} 42\frac{1}{2}'$ E.; variation, $5^{\circ} 30'$ E. (1828.)

LÜTKE OR EAST FAÏEOU ISLAND.†—This little island possesses a name which was repeated in another to the westward; hence its prefix by Capt. Lütke. Krusenstern proposes the name of *Lütke Island* on this account. It is but a small islet, not more than a mile long, and about three quarters of a mile broad. The Caroline islanders sometimes touch at this island in their passages to procure fresh water, which is deposited by the rain in a small basin on it. It is in lat. $8^{\circ} 33' 20''$ N., lon. $151^{\circ} 26'$ E.‡

The NAMONOUÏTO GROUP.—The S.W. isle of this group was seen by Capt. Ibargoitia, in the *Philippine*, in 1801. He called it *Anonima*, because it did not appear on the charts. It is the same island named by Morrell *Livingston Island*, in 1832. In Capt. Duperrey's chart, it is called *Bunkey's Island*, from the name of a commander who crossed, so it is stated, the group in 1824.

The Namonouïto group, according to Capt. Lütke's observations, lies between lat. $8^{\circ} 33'$, and $9^{\circ} 0'$ N., and lon. $150^{\circ} 31'$, and $149^{\circ} 47'$ E. Whether as the commencement or the base of a group of islands, or else of a single island, which some day will exist here, this place merits particular attention. It presents all the aspect of the coral formation from its origin. Either from its later formation or its greater extent, it remains behindhand of the rest of the group, and does not yet form but the elements of a group. Here is the bed of the future coral dike, having a depth equal to 20 fathoms, and bestrewed with banks of little depth. At the windward limit of this dike, there are already some islets united together by a reef, but is not yet continuous; on the opposite side there is also an island. The reefs extend from the two extremities for a short distance along the dike, the space between it and the reefs being occupied by submerged banks, which are still separated by large intervals. It would be interesting to follow the progress of this incipient coral group, which may take thousands of years to completely form, and would then be one of the largest, being 85 miles from East to West.

The south-easternmost of the windward group is *Piserarr*, or *Pisserarre* (or *Pizaras* of M. Chamisso), and is in lat. $8^{\circ} 34' 20''$ N., lon. $150^{\circ} 32' 30''$ E. Beyond this, on the N.E. face, are *Ounalik*, *Amytideu*, *Pilipal*, and *Onooup*; and N.W. of these again are two other islets, *Maghyr* and *Maghyrarik*. These three groups are united to each other by a reef, on which the sea breaks in some parts; in others only marked by the greenish colour of the water.

The south-westernmost island, *Onooun*, the *Anonima* of Ibargoitia, is in lat.

* Voyage du *Séniavine*, tome II. pp. 291—293.

† It may be observed that Admiral Krusenstern has applied the name of Lütke to the large group to the West, next described in his atlas. This is probably an oversight.

‡ Voyage du *Séniavine*, tome II., pp. 293-4.

8° 36' N., lon. 149° 47' 30" E. Between it and Maghyr, the reef consists of a series of submerged shoals. Capt. Lütke did not land on these islands, but was visited by numerous canoes.

The MANNAÏJEU BANK, which was stated by Chamisso to be found by Don Luis Torres in lat. 8° 20' N., lon. 149°, and had 21 fathoms water on it, was unsuccessfully sought for by Capt. Lütke in this position. He sailed on this parallel as far as lon. 148° without finding bottom with 50 fathoms of line. The determination of the position of this bank is important, as it may be an island or reef in course of formation. It is said that the discoverer sailed for three entire days on it.

LOS MARTIRES ISLANDS were seen by Duperrey, who places them in lat. 7° 34' N., lon. 149° 29' E. Morrell says they are three in number, all small and low, with dangerous reefs jutting out from them in all directions. They are thinly populated, and appear to be very lightly wooded. The largest and most abundant are the cocoa-nut trees; but the inhabitants are badly supplied with fruits. There is but little inducement to visit these islands, the less so on account of the reefs and dangers, the strong currents which set between them, and also from the hostile and treacherous character of the natives.

ENDERBY ISLANDS, a name given to a group by Capt. Renneck, in 1826, in the service of the well-known noble merchants of London. In 1799, Capt. Ibargoitia discovered an island, which he called *Kata Island*; but Freycinet decided that it was in reality two islands, one of which is called *Poulouhot*, and the other *Alet*, which is in lat. 7° 19' 25" N., lon. 149° 17' E.

POULOUSOUK, SOOUGHE, or IBARGOITIA ISLAND, was seen by Capt. Ibargoitia in 1799 and 1801. It was named *Poulousouk* by Capt. Freycinet, and was taken by Ibargoitia, though with no probability, for the *San Bartolomé* of Quiros, in 1597. Its position is about lat. 6° 40', lon. 149° 8' E. The commander of the *Naiad* places it in lat. 6° 35', lon. 148° 22' (corrected). It is of coral formation, covered with cocoa-nut trees, and similar in size and appearance to Poulouhot. It is well inhabited by a light-complexioned race. It is called *Soouge* on Lütke's chart. At 5 leagues to the East of it is a bank seen by the vessel *La Paz*, in 1819.

PYGHELLA or COQUILLE ISLET.—This small islet was seen July 3, 1824, by Capt. Duperrey, in lat. 8° 12' N., and lon. 147° 41' 30" E. It was named after Duperrey's vessel by Krusenstern; the discoverer named it *Bigali*; Lütke writes it *Pigali*, or *Pyghella*. Don Luis Torres, who saw it and the adjacent island, names them *Pigouelao* and *Faliao*. It is not more than 300 yards in diameter, and nearly level with the water's edge, and surrounded by a reef. It is covered with a thick undergrowth of bushes, and about fifty cocoa-nut trees. It is inhabited.

FAÏEOU ISLET, which lies in lat. 8° 7½' N., lon. 146° 47' 30" E., that is, 55 miles exactly West of Pyghella, is a similar islet to it, both in size and character; the reef forms a small bay on it. There is a high wood on it, among which bread-fruit trees were seen, but not a single cocoa-nut tree. It is also inhabited. There is another island of the same name to the eastward, before alluded to, which has been named Lütke Island for distinction.

The *Oraïtilipou Bank*, seen by Don Luis Torres, lies somewhere between these two islets. It had but 11 fathoms over it, but was not found by Lütke, after a careful search.

LYDIA ISLAND is marked on Capt. Duperrey's chart in lat. $8^{\circ} 38'$, lon. $147^{\circ} 10'$, but its existence may be considered as doubtful.

SETUAHAL or TUCKER ISLAND was seen by Capt. Wilson in the missionary ship *Duff*, October 25, 1793. Duperrey places it in lat. $7^{\circ} 22' N.$, lon. $147^{\circ} 6' E.$ The island is not more than 2 or 3 miles in circumference, and the articles of subsistence it produces are supposed to be only fish, roots, coconuts, and, perhaps, bread-fruit. When the *Duff* approached, some canoes of natives, not a stout race, came off, and two men, Tucker and Connelly, deserted here. The commander of the *Naiad* (1846) says that it may be approached within one-quarter of a mile, as no hidden danger exists: that it is of coral formation, covered with cocoa-nut trees, and has about 350 inhabitants.*

NAMURREK or SWEDE ISLANDS.—These islands consist of three separate groups, that to the East being named *Namurrek* (or *Namouttek*); the westernmost, *Elato*; and the southernmost, *Namoliaour*. They are most likely the islands named *Swede* and *Haweis* Islands by Capt. Wilson, of the *Duff*, 1793, the first on account of a Swedish sailor of his, who was landed at his own request on one of them. They were examined by Lütke, who places *Namurrek* in lat. $7^{\circ} 32' N.$, lon. $146^{\circ} 30'$.

Elato is nearly on the same parallel as *Namurrek*, in lat. $7^{\circ} 30' N.$, lon. $146^{\circ} 15' E.$ This side of the group consists of an uncovered reef, with some islets, one of which is called *Falipi*. On the chart of Cantova, nearly in this spot, is marked *Bank of Falipi*. Can this bank have become an island in the interval of 100 years? There is a port in the *Elato* group, and the vessels sent from the Marianas to collect biche-de-mar always stop here. Capt. Lütke could not find the entrance to the lagoon, which he was afterwards told was on the eastern side, contrary to the usual law of coral reefs. The natives were very shy, and would not visit his ship.†

OLIMARAO ISLES, two small islets surrounded by a reef, discovered in 1828 by Capt. Lütke, in lat. $7^{\circ} 43' 30'' N.$, lon. $145^{\circ} 56' 45'' E.$ The group is not more than 5 or 6 miles in circuit, and seems to have some timid inhabitants, who asked for food.

IFALOUK or WILSON ISLANDS.—This is a small group, seen as *two isles* by Wilson, in the *Duff*, in 1793. They were visited by Lütke, April 3, 1828, and were found to consist not of two, but of *four* islets: *Ifalouk* (or *Evalouk*), *Moai*, *Ella*, and *Fararik*, lying, as usual, on the edges of a lagoon about 5 miles in circumference. This group is more populous in proportion than the others. The *Séniavine* was soon surrounded by twenty-five canoes, containing at least a hundred natives, who were distinguished from all the rest of the Carolinians by their clamorous disposition; he had some little trouble from their stealing propensities. The commander of the *Naiad* says there is a good boat passage

* Missionary Voyage; Purdy's Tables, p. 153; Naut. Mag., 1849, p. 26.

† Voyage du *Séniavine*, tome II. pp. 127—129.

through the reef, on the South side of the group. The islets are covered with cocoa-nut trees.

The OULEAÏ or OULLEAY GROUP.—Capt. Wilson, in the *Duff*, 1793, discovered a group which he named the *Thirteen Islands*; but when the minute examination was made by Lieutenant Zavalichine, Capt. Lütke's officer, it was found to consist of twenty-two islands, the names of which are very well designated on Capt. Freycinet's chart and by M. Chamisso. The name, as given on the chart on a large scale then drawn up, is *Oulleay*, in the narrative, *Ouleaï*.

From the observations made in the *Séniavine*, the southern point of *Raour*, the easternmost of the group, lies in lat. $7^{\circ} 20' 7''$ N., lon. $143^{\circ} 53'$ E.

The charts of this group are a very good example of what exaggeration will do to mislead the navigator. In the old charts this group occupies a space of *two or three degrees* in longitude. Capt. Freycinet reduced it to *seventy miles*; but when the survey was made by Capt. Lütke, it was found not to exceed *six* nautic miles in extent.

The fatiguing uniformity of the coral islands has at least this advantage, that one description serves for all. But the Ouleaï group differs from the others in this respect. Its figure is very irregular; it has two projecting angles to the North, and a deep indentation between them. According to the usual hypothesis of formation, this figure cannot be explained but by supposing that two independent groups were formed at the same time in this part. The channel of 12 yards, between the Islands of *Anguligarail* and *Farailes*, seems to mark their separation. The reef, which extends thence to the S.E., reunites abreast of *Motogoxeu* to the reef running from *Raour* Island, thus completing the eastern group; at the same time a depth of $4\frac{1}{2}$ fathoms, and the reef extending East and N.E. from *Felalis*, marks the direction of the prolonged reef, which would in time reach to *Farailes*, and form the western group.

OULEAÏ, properly so called, is advantageously distinguished not only from the rest of the group, but from the generality of coral islands. Its southern side has not the shoal which renders landing so difficult elsewhere; but the shore rises with a tolerably steep ascent, presenting an even, clean, sandy bottom, on which every grain of sand may be seen through the transparent water at the depth of several fathoms. The interior of the island is pleasant; it is a wood intersected in all directions by footpaths, and dotted with cleared spots, where you meet with isolated houses. Unlike the generality of coral islands, when you advance only a few steps from one shore, and then reach the opposite, it occupies a large space, on which fine bread-fruit trees have sufficient room to form a sort of park. It occupies the N.E. angle of the group, and is of an irregular triangular form, three-quarters of a mile in diameter. Its North extreme is in lat. $7^{\circ} 22' 6''$ N., lon. $143^{\circ} 57' 53''$ E.

Palliou Island extends from its S.E. extremity in a nearly true South direction, and is nearly connected with *Raour Island*, the south-easternmost of the group, the two together being $1\frac{1}{2}$ miles in length.

On the western side of *Raour*, off the North part of which the *Séniavine* anchored, are four or five artificial harbours, such as had not been seen in any other part of the Carolines. A jetty of large stones ran out for 100 yards into

the sea, and at each side of its extremity another line of stones, projecting at an angle of about 60° , so that the whole has something the form of an anchor. From the South end of Raour the reef projects nearly half a mile; and between it and *Tagoilap Island*, 2 miles to the W.N.W., is *Motogozeu Islet*, which is very small, and, like all the rest, surrounded by a reef, so that the anchorage in the eastern group has two entrances, one on each side of Motogozeu.

Felalisse Island, the S.W. of the group, lies 2 miles to the S.W. of Tagoilap. Between it and Motogozeu there are some detached coral patches. The reef runs to the N.W. three-quarters of a mile from Felalisse, leaving a navigable opening into the lagoon between it and *Faluellap*, a small islet, one of a group which extends N.N.W. and N. $1\frac{1}{2}$ miles to *Oulemeray*, the N.W. island of the group. Thence the chain is continued through *Seliape* and some smaller islands to E.S.E. to *Furaillesse*, between which and *Langaligaraile* is the very narrow but navigable channel before alluded to, forming a northern entrance to the lagoon.

The group is there about 6 miles in extent, East and West, and 3 miles in its average breadth. The inhabitants, both in exterior and character, differ but little from the Lougounorians before described. Their numbers were estimated at about 350 able men, without women or children.

The magnetic variation at Raour, in 1828, was $2^\circ 25'$ E.

FARROÏLAP (or Fattoïlap) was in reality first discovered by Lütke, March 28, 1828. Such an island is stated to have been seen by D. L. Torres, but it had been placed at hazard on all charts previous to its position being fixed as lat. $8^\circ 36'$ N., lon. $144^\circ 36'$ E.* It is a small group, not more than 4 miles in circuit, and composed of three islets, with a lagoon in the middle. The group cannot afford much for resources. Its population is about sixty able men.†

EOURYPYG is a small group, composed of only two islets. Lütke, who passed along its northern side, had no communication with the inhabitants who he saw standing on the beach, consequently could gather no particulars of it. It has a lagoon. Their existence was then established, though on Arrowsmith's chart two islands are placed nearly in this position, stated to have been seen by Capt. Hunter in 1791; there is no notice of this given in his narrative. Their position is lat. $6^\circ 40'$ N., lon. $143^\circ 10'$ E.; var., $3^\circ 40'$ E. (1828). The commander of the *Naiad* calls them the *Kama Islands*, and were visited by him in September, 1844. The population amounted to about 150. The islets produce nothing but cocoa-nuts.

SOROL or PHILIP ISLANDS, two small islands, both seen by Capt. Hunter in 1791. The easternmost is the largest, and is 5 miles from the other. On Capt. Lütke's chart they are placed in lat. $8^\circ 6'$ N., lon. $140^\circ 52'$.

FEYS or TROMELIN ISLAND.—In 1828, Capt. Legoarant de Tromelin discovered a small low island in lat. $9^\circ 52'$ N., lon. $140^\circ 42'$ E., to which Admiral Krusenstern gave his name. It is said that it is 5 miles long and 2 miles broad.

* "It is rather singular that Capt. Wilkes should state this island to be in lat. $10^\circ 45'$ N., lon. $146^\circ 27'$ E., from the charts. The *Flying Fish* consequently passed over this position without seeing any indication of land; the same with Feis Island."—*Narrative of the United States Exploring Expedition*, vol. v. p. 271.

† Voyage du *Sénaclaire*, tome II. pp. 135—142.

Capt. Lütke examined it in 1828, and places it in lat. $9^{\circ} 47' N.$, lon. $140^{\circ} 38' E.$, calling it *Feis* or *Feys*. The size he mentions is also very different from Capt. Tromelin. He says:—This island is remarkable, because it is the only one of the Carolines that has no lagoon; it is formed of madreporic rocks, 30 feet high, against which the sea beats immediately. It is *four versts* ($2\frac{3}{4}$ miles) in circumference. There is no anchorage in any part. On the South side, where the coast is sandy, there is less surf. Landing was very difficult here, and the natives were not so good sailors as in any other island of the archipelago. Bread-fruit trees were rare, but bananas were in tolerable abundance. Variation, $1^{\circ} 30' E.$

The OULUTHY or MACKENZIE ISLANDS.—This group was discovered by the Spanish navigator, Egoi, and was seen in 1823 by Capt. Mackenzie, who gave some notice of it in the *Asiatic Journal* for June, 1824. It was partially examined by Capt. Lütke, who states that the native name is Ouluthy.

It was on one of the group, Mogmog, that the Spanish Jesuit, Padre Cantova, was killed on his second visit to the Carolines.* This was during the endeavours to establish Catholic missions throughout the archipelago. When Capt. Lütke passed Falalep, on which the mission was planted, he was unable to land; which is to be regretted, as it would be interesting to learn the result of the missionaries' devotedness after the lapse of a century.

The Islands Mogmog, Falalep, and others, on which was this Spanish mission, are at the eastern part of the group. The whole is of great extent, and consists of a number of low coral islands, covered with cocoa-nut trees, and connected by coral reefs, forming a large lagoon inside, with many good passages through the reef leading into it. This group is thickly populated by a light-complexioned race, whose manners and customs are similar to those of the other Caroline islanders. These natives, although apparently mild and friendly to a stranger, are by no means to be trusted, as one or two Manila vessels were cut off at this group some years ago.†

The two small islands on the eastern group, *Ear* and *Khilap* or *Hielap*, are connected by a reef to each other and to some others beyond them. These isles are inhabited, and from them a shoal extends for 15 miles to the S.E. The bottom was distinctly visible on its outer edge from the *Séniavine*, but some natives who approached said there was no danger in approaching these islands, though their notions of such danger might be very different from ours.

The western group, which is 8 leagues in extent from North to South, is formed of a great number of small islands, united together by coral reefs. The two groups are separated by a chain 8 miles broad, into which Capt. Lütke entered as far as the middle. The United States' schooner, *Flying Fish*, entered the lagoon with not less than 7 fathoms on the bar, and procured some fish and cocoa-nuts from the natives.

The S.W. point of the eastern group, which may be taken as the centre of all the islands, is in lat. $9^{\circ} 56' N.$, lon. $139^{\circ} 50' E.$; and the Island Mogmog, the northernmost of the western group, is in latitude $10^{\circ} 6' N.$, lon. $139^{\circ} 45' 30'' E.$

* See Burney, Chronol. Hist., vol. v.

† Nautical Magazine, January, 1849, p. 27.

Capt. Wilkes makes the East extremity of them in latitude $10^{\circ} 7' 53''$ N., and longitude, $139^{\circ} 54' 58''$ E.; variation, $2^{\circ} 0'$ E. (1828.)

YAP or EAP has been seen by many navigators, both in early times and more recently. The Padre Cantova gives it a circumference of 40 leagues, but it is not nearly so extensive. It is frequently made by ships taking the eastern passage to China, and is also called *Unawb* by Capt. Horsburgh.

At a distance it assumes the appearance of two or three islands, and when nearer it seems like a group of islands contiguous to each other, the whole encompassed by a chain of black rocks. This deception probably caused Capt. John Hunter, who passed it in 1791, to place three islands in this situation.

The island has a pleasing aspect from the sea, being interspersed with many houses. It is estimated to extend from North to South about $3\frac{1}{2}$ leagues, and the position of the North end has been inferred to lie in latitude $9^{\circ} 40'$ N.; of the South end the latitude has been given from the mean of several observations, $9^{\circ} 30' 30''$ N.; the longitude, also from numerous observations, from $138^{\circ} 7'$ N. to $138^{\circ} 8\frac{1}{2}'$ E. The southernmost land is low, but rises to the northward into hills. The island is not covered with wood, but many parts appear luxuriant and abound in cocoa-nut trees. On the southern and western sides the reef is dangerous, and it extends in a W.S.W. direction 2 leagues from the S.W. end of the island. It is steep-to, and some of the black rocks appear just above water near its extremity.*

The commander of the *Naiad* remained here seven weeks in 1843, collecting biche-de-mar. It has an excellent harbour on the S.E. side, formed by reefs; the entrance to which can easily be discerned from the mast-head when standing along the reef. Yap is thickly populated by a light-complexioned race; they are of a treacherous disposition, and have cut off several Manila vessels which have gone there to collect biche-de-mar. The chiefs confessed to the captain of the *Naiad* that they had taken two Spanish vessels; the last one having a crew of fifty Manila men, who were all massacred.

The tribe at the harbour had formed a conspiracy to cut them off, but they were put on their guard by a neighbouring hostile tribe. No merchant vessel passing should have any intercourse with these natives or allow them on deck, as they are not to be trusted.†

HUNTER'S REEF, a narrow coral reef, over which Capt. John Hunter passed in the *Waakzamheydt*, July 17, 1791. He had 16 fathoms water when on it, and saw the bottom very distinctly. It extends nearly North and South, and is about 7 leagues N. by E. of Yap. Lat. $9^{\circ} 57\frac{1}{2}'$ N., lon. $138^{\circ} 13'$ E.‡

THE MATELOTAS ISLANDS.—The first notice of these islands was given by Villalobos, who discovered them in 1545, but it would appear that they had been previously visited, for the inhabitants approached holding up a cross, and calling *Buenas dias Matelotas*, from which their name was given.§ On Capt. Lütke's chart they are called the *Western Lamoliaour Group*, and they have

* *Oriental Navigator*, p. 601; *Purdy's Tables*, p. 152; *Horsburgh's Directory*, vol. ii. p. 574.

† *Nautical Magazine*, January, 1849, p. 27.

‡ *Hunter's Historical Journal*, p. 27.

§ *Burney*, vol. iv. p. 230.

been called the Goulou Islands. They were seen in 1796 by Admiral Rainier, in the *Suffolk*, who gave them the name of *Spencer Keys*.

The Matelotas group is composed of three small, low, and wooded islands, connected by reefs and sand-banks. The two northern ones bear from each other N.E. $\frac{3}{4}$ E. and S.W. $\frac{3}{4}$ W., and it is dangerous to approach them in the night, as a coral reef projects 2 leagues to the northward of the N.E. island, having in some places high breakers. On January 3rd, 1798, Capt. Moring, in the ship *Duckinfield Hall*, had great difficulty in weathering the group. He says:—"How far the reefs may extend to the westward I cannot pretend to say, but they stretched farther than we could see on a clear day: the distance from the northernmost to the southernmost island is about 6 leagues."* In 1843 the South island was inhabited, but the population did not amount to more than thirty-five souls, who live entirely on cocoa-nuts and fish.

The North extremity is in lat. $8^{\circ} 41' N.$, lon. $137^{\circ} 40' E.$; the South extreme in lat. $17^{\circ} N.$, lon. $137^{\circ} 33' E.$

PELEW ISLANDS.

There is no doubt but that these islands are the same as the Arrecifos of Villalobos in 1545.† According to the Spanish missionaries, Padres Clara and Cantova, the native name is *Paulogue*; other authorities call them *Palaoa*, *Pally*, or *Pallou*. In the charts made by Capt. Macluer they are called *Pellew*. But the name by which they are generally known is that first given, which, though not exactly correct, has for this reason been retained.

It is very generally known that we acquired a more particular knowledge of these isles, and their worthy inhabitants, from the wreck of the *Antelope* packet, Capt. Wilson, which was lost upon the coast in 1783. "The captain," says an intelligent writer, "found the natives delicate in their sentiments, friendly in their disposition, and, in short, a people that do honour to the human race. The astonishment which those who first discovered the English manifested on seeing their colour, plainly shewed that they had never before seen a white man. The country is well covered with timber trees, the trunks of which furnish the natives with canoes, some large enough to carry thirty men. Yams and cocoa-nuts, being their chief articles of subsistence, are attended to with the utmost care. They have, also, the bread-fruit tree, oranges, lemons, and other fruits. The men go entirely naked; the women nearly so. The conduct of these people towards the English was uniformly courteous and attentive, accompanied with a politeness which surprised those who were the objects of it."

Capt. Robertson, in his Memoir of 1795, has very justly censured the officers of the *Antelope* for not having given, in any part of their narrative, the smallest information, or "said one single word, whether it was possible for a ship to anchor amongst, or near, any of these islands;" and he observes that the only piece of nautical information he could find is the general description of their limits, which he has shown to be grossly erroneous. Capt. Robertson says that the group "is a distinct range or chain of islands, extending 28 leagues in length

* Oriental Navigator, pp. 574-5.

† Burney, vol. i. p. 231.

N.N.E. and S.S.W., but in breadth very narrow; they are of moderate height, small in size, and in number almost innumerable; they have often been seen by the India Company's ships, going to China by the eastern passage. In the *Vansittart*, 1781, I had an opportunity of exactly determining their southern extremity and eastern direction; we fell in with that side, and stood on to the N.N.W., thinking to weather them. After getting sight of the northern islands, the wind changed more northerly, which even prevented us from being able to weather the island we at first took to be the northernmost, but which we found was not so; therefore, judging it impracticable to get to windward, without a great loss of time, we wore and stood to the southward, coasting along the islands, at the distance of about 4 or 5 leagues from their East side; rounded the southernmost, at the distance of 3 leagues; from which we took a departure, allowing the latitude, by a good meridian altitude, to be $6^{\circ} 56' N.$; the northernmost island I make to lie in lat. $8^{\circ} 9' N.$, from estimated bearings and distance, two hours after the noon observation, which I was happy to find, on comparison, perfectly agreed with the remarks of those ships which passed to the northward of them, and had every opportunity of settling their true latitude. As to the longitude, I am not quite so certain; there is such a discordancy in all the accounts, that it is impossible for me to determine exactly. I have taken the mean of what appeared to me most satisfactory; which, I believe, is not very far from the truth. I had expected much satisfactory and authentic nautical information respecting these islands from Wilson's account of them, published by Mr. Keate; but in that I was sadly disappointed, there being not one useful remark, throughout the whole book, that could possibly be of the smallest utility to a seaman."

A sketch of the southern range of these islands, by Lieutenant John Maclier, was published by Mr. Dalrymple, in 1791, and the following information has since been collected:—

The circumstance by which this group and its history are made most familiar to English readers, is the account of *Prince Lee Boo*, who was brought over from thence by Capt. Wilson, after the wreck of the *Antelope*, August 9, 1783. He was the second son of Abba Thulle, the king, and on his arrival in England evinced such an aptitude for all civilized relations, with such an excellent disposition, that his death, from small-pox, which occurred December 27, 1784, when he was twenty years old, was felt throughout England with lively sensation. He was buried in Rotherhithe churchyard, near its N.W. angle, he having died in that parish. The East India Company erected the vault, now (1850) in good preservation, over his remains.*

In the Supplement to the Voyage of the *Antelope* an account is given of the visit of the ships *Panther* and *Endeavour*, which were sent out there with the intelligence of Prince Lee Boo's death. In this portion, too, is the account of Lieutenant Maclier's residence in the group. The whole of these narratives place the natives in a most amiable light. But there is a dark side to the picture;

* An Account of the Pelew Islands, from the Journals of Capt. Henry Wilson, by George Keate, 4to., 1788; also a Supplement to the foregoing, by J. P. Hockin, M.A., 4to., 1803.

whether from the innate evil of the uncultivated savage, or, what is more probable, from the aggressions of foreign ships touching there, their fame has been sullied by treachery. The *Syren*, whaler, Capt. Coffin, was nearly cut off here, March 21, 1823, on passing the southernmost island. They came on board, 100 in number, apparently friendly; but watching an opportunity, they attacked the crew, and were only repulsed after desperate fighting, during which most of the crew, thirty-seven in number, were wounded, and two officers killed.*

Capt. Ibargoitia remained under easy sail for five days, in 1801, off the islands, and gives as good an account of the natives, with whom he had continual communication, as does Capt. Wilson; they most disinterestedly brought off to him fish, cocoa-nuts, bananas, and various roots. He says that Coror Island is the only one where you can anchor; but he was prevented doing so by winds and currents.†

The group extends for a distance of 40 leagues, in a North and South direction; its greatest breadth is not more than 5 leagues; but taking into account the surrounding reefs, this breadth would be doubled. It may be separated into several minor groups, described as follows:—

KYANGLE ISLES.—The northern limits of the group consist of four small islands, the largest of which is called *Kyangle*, having a circumference of 4 miles, in lat. $8^{\circ} 8' N.$, lon. $134^{\circ} 50' E.$, or perhaps more correctly, $134^{\circ} 35' E.$ It was called *Moore Isle* by Capt. Douglas, in 1788.‡ The three others are called *Arayonzet*, *Carapellas*, and *Korack*. The islands are surrounded by a reef, whose diameter is $4\frac{1}{2}$ miles North and South. Capt. Douglas, of the *Iphigenia*, saw two other low or sandy isles at 8 miles West of Moore (Kyangle) Island, which he calls *Good Look-out Islands*, portions of the reef which dry in Macluer's chart.

The REEF to the northward of Kyangle is of a most dangerous character; the more so that there is some uncertainty as to its extent. On Dalrymple's chart it does not exceed the limits of the Kyangle group; but from the evident assertion of Capt. Douglas, that it extends to lat. $8^{\circ} 45'$, and that from this it extended to the West farther than the eye could reach, so that Admiral Krusenstern has on his chart extended it to lon. $134^{\circ} 20'$, and further, as but little is known to the southward of this N.W. extreme, he has continued the reef over all the space to Douglas's Good Look-out Islands.

KOSSOL.—At 3 miles South from the Kyangle Islands is a small sandy island, named Kossol, separated by a channel, probably full of banks and breakers, 10 miles broad, from the North end of Babelthouap.

BABELTHOUAP or *Baubelthouap* (the upper sea, in the Pelew language) is the largest of the Pelew Islands. It is 9 leagues long North and South. A high mountain, from the summit of which Lieutenant Macluer could see the whole group, is in its northern part, in lat. $7^{\circ} 40'$. Its eastern extremity, according to Krusenstern's, or rather Macluer's, charts, lies in lat. $7^{\circ} 41' N.$, lon. $134^{\circ} 58' E.$; and its northern point in lat. $7^{\circ} 49' N.$, lon. $134^{\circ} 52' E.$ But according to the commander of the *Naiad*, these longitudes are $18'$ too far East. He made the East end of Babelthouap to be in lat. $134^{\circ} 40' E.$ §

* Horsburgh.

† Memoires D'Espinosa, tome ii. p. 26.

‡ Meares's Voyage, p. 208.

§ Nautical Magazine, 1840, p. 27.

It is (or was) divided into several districts, of which *Artingall*, *Emmelagui*, and *Emevings*, are the most considerable. Three small islands, *Arteck*, *Kattou*, and *Oorokoo*, lie near the North point of the island.

COROR, or *Corrora*, is separated from Babelthouap, bearing South from it, by a channel 2 miles broad. According to Macluer's chart, it is composed of several islands, so close together that they may be taken as one. The king or chief of the Pelew Islands resides at Coror, or at least the celebrated Abba Thulle did in 1783.

According to the chart above named, there is a reef to the East of the channel, which extends in a N.E. and S.W. direction for 10 miles. The space between this outer reef, that which closely surrounds the two islands, would form a safe harbour; it is called *New Harbour* on the chart. The depth shown is from 10 to 14 fathoms, but there are several shoals.

URUKTHAPEL is to the South of Coror. Macluer's charts differ as to the breadth of the channel, it being shown as 5 and $2\frac{1}{2}$ miles. All this space is occupied by a reef, across which is a passage, leading to an excellent port, perfectly sheltered from the N.E. and S.W. winds by the Islands of Coror and Urukthapel, and from those from N.W. by the Islands *Amallakell*, *Assakysui*, and *Imungs*. But it must be observed that the charts drawn up in 1793 are not sufficiently explicit to be depended on; because on one of them is the remark, should the middle channel prove navigable, it will be an excellent harbour in both monsoons, evidently showing that it had not been examined. Horsburgh says:—"Fronting the high bluff, East point of Urukthapel, there is a large opening in the reef, with anchorage and good soundings, in lat. about $7^{\circ} 16'$, having a small channel to the N.W., with 7 and 8 fathoms, through the middle of the reef inside, between that island and Coror. When within the opening of the outer reef, another branch of the channel stretches along the East side of Coror to the N.E., where there is good shelter inside the reef; and this channel leads round the East and North sides of Coror, to the western point of the island, with soundings in it from 10 to 25 fathoms.

ERRAKONG lies to the South of Urukthapel. The reef which surrounds the two islands on the East side forms to the S.E. of the first a very excellent port, which has two entrances, one to the East, the other to the West. The latter is round the South end of Urukthapel, between it and Errakong and some small islets; but as it is not more than half a mile broad, and is probably not well described, it cannot be recommended to large ships. But to make up for this there is to the East of the island two other passages across the reef, which may be preferable to it; the first, in lat. $7^{\circ} 14\frac{1}{2}'$, is three-quarters of a mile broad; the second, $1\frac{1}{2}$ miles to the southward of it, is much narrower than the former, but Lieutenant Macluer passed it in his vessel. This is apparently the harbour named by Horsburgh Errakong Harbour.

OOROLONG, a small island, not more than 3 or 4 miles in length, lies off the N.W. point of Urukthapel. Macluer first anchored near this island, and then steered to the S.E., along the coast of the latter island to reach Errakong Harbour. Krusenstern places the island in lat. $7^{\circ} 18' N.$, lon. $134^{\circ} 33\frac{1}{2}' E.$ Errakong Harbour is in lat. $7^{\circ} 11' N.$, lon. $134^{\circ} 39' E.$

PELELEW, a pleasant and fertile island, lies $7\frac{1}{2}$ miles South of Errakong. It is 8 miles long in a N.N.E. and S.S.W. direction. Between its North extremity and Errakong, and within the great reef, there lie, according to Macluer's chart, several islands, one of which, named *Akamokum*, is separated by a reef, across which is a passage not more than a quarter of a mile broad, through which it is thought Macluer passed, as it is stated to be a good channel. At the South extremity of Pelelew, or *Pillilew* according to Horsburgh, the reef which surrounds the group on the West side commences; within its limits are several islands, as *Kylo*, *Kourakong*, and *Imillis*, which appear to be connected with each other by reefs and shoals. The South extremity of Pelelew is in lat. $6^{\circ} 58' N.$, lon. $133^{\circ} 27' E.$

ANGOUR is the south-westernmost island of the group. It is low, and extends 3 or 4 miles in a N.E. and S.W. direction. The channel which separates it from Pelelew is 5 miles broad; it is safe, but there are no soundings, the two extremities of the islands being steep-to. Capt. Ibargoitia, who beat through to the westward with a westerly wind, could find no bottom even at a mile off the shore. He sent off a boat to the South end of this island to procure water, but it could not approach within 2 cables' length of it, on account of the shallowness and the surf. The natives attempted to serve them, by bringing some off in their canoes by means of the casks, which were carried half a mile into the woods; but they brought but little, and that not good.

Directly to the West of the S.W. point of this island, at the distance of half a league, Lieutenant Macluer found a bank with 10 fathoms water; and in 1806 the same commander, in the ship *Mangles*, found a reef extending half a mile from this low sandy point; but Capt. Horsburgh, who passed close to the point in the *Anna* in the same year, did not see it, so it is supposed not to exist.

Capt. Ibargoitia, who calls this island *Niaur*, determined the latitude of its S.W. point to be in $6^{\circ} 53' 55'' N.$, lon. $134^{\circ} 31'$. Mr. Horsburgh observed its lon. as $134^{\circ} 21'$; the mean may be taken as $134^{\circ} 26\frac{1}{2}'$. But a recent account states that by several measurements, by good chronometers, from Macao and Manila, that it ought to be in $134^{\circ} 6'$, so that, as elsewhere noticed, the whole group is placed nearly $20'$ too far East.*

* Nautical Magazine, January, 1849, p. 27.

CHAPTER XXXIII.

ISLANDS BETWEEN LATS. 10° AND 20° N., INCLUDING
THE LADRONE ISLANDS.

CLIPPERTON ISLAND was discovered, in 1705, by a companion of Dampier's, Capt. Clipperton, who separated from him on the coast of South America, to go to the Indies, in which passage he fell in with this *rock* or island. Its position, as given, was not very far from the truth, but its existence was doubted until recently.

Capt. Sir Edward Belcher is the first who made us acquainted with the exact character of this rock. He made it May 8th, 1839, at the distance of 15 miles, at the dawn of day; and the sun's rays playing on its nearest face, it had the appearance of a brig close hauled. "The name, Clipperton Rock, certainly misled us, and had we made the point at night, with a fair wind, would almost *inevitably* have severely damaged or destroyed both vessels. I certainly should have steered to pass it to the northward, merely assuming it to be a solitary rock."

Nothing in this name could lead a seaman to imagine a high rock, placed on the southern edge of a coral lagoon *island*, 3 miles long N. and S., by the same E. and W.

Its description should stand thus:—A very dangerous, low, lagoon island, destitute of trees, with a high rock on its southern edge, which may be mistaken for a sail.

This rock can be seen 15 miles. In thick weather the low coral belt, which appears like sand, will not be distinguished until close to it. The breakers on the eastern side do not afford sufficient warning for a vessel to turn or change course. On the northern part of the belt, the land is a little raised, and appears to be clothed with something like grass.

There are two entrances, which at high water may be safe; but at the moment we passed, the surf was too heavy, and the reflux showed the rocks bare. The high rock is situated in lat. 10° 17' N., lon. 109° 10' W., the dangers from it northerly extending 2 miles easterly, and the same north-westerly. On the beach several large trees were observed, and an object, which was thought to be part of a vessel, near the western opening.

In the centre of the lagoon, as viewed from the mast-head, there is one hole of blue water, and a second belt is connected with rock, attaching it to the East side of the island. This *literally* constitutes two islands formed by its two openings; *both* are on the *weather* side of the island.

No living trees were seen, but the whole island was covered with gannet, boobies, frigate pelican, and several kinds of tern, which had also been noticed in great numbers during the previous week, at least 500 miles to the eastward. From

this an easterly current may be inferred, as these birds generally keep in its stream or tail course.*

No bottom was obtained by the *Sulphur* with 100 fathoms of line, but the *Starling* had soundings with less than 100 on the northern side.

Sharks, porpoises, and turtle were observed together. The former annoyed us much by biting at our patent logs, for which one was taken and made an example of. They were very large, and literally swarmed. In all probability they were attracted by a shoal of file (*balistes*), and other small fish, which had been feeding off our copper since quitting the Island of Cocos.†

PASSION ISLAND or ROCK.—The existence of this has been the subject of much doubt, arising from the very contradictory statements as to its position. It is stated to have been discovered in the early part of the last century, by Capt. Dubocage, in *La Découverte*, of Havre, on a Good Friday, and from this circumstance it takes its name. This account is alluded to by Le Barbinaise, who made a voyage to the South Seas in 1714. The position stated is lat. 4° N., lon. 106° W., but on Espinosa's chart it is given as lat. 16° 54' N., lon. 109° W.‡ This great incongruity, however, is in some measure set at rest by the following recent extract :—

“On December 2nd (1847?) observed an island bearing W.N.W., which though (as laid down) would have been 60' distant, we could only believe to be the Passion Rock. As we passed less than 30' to the West of it in July last, and did not see it, and now passed 60' to the East of it, it is possible it may be laid down 30' too far to the West.

“Latitude and longitude, from bearings and supposed distance, 17° 11' N., 106° 21' W. It appeared, from aloft, high, and peaked in several places.”§

REVILLA GIGEDO ISLANDS.

This is a small group to the southward of the Californian Peninsula, that was discovered in one of the early Spanish voyages. Fernando de Grijalva, in 1523, named the principal island Santo Tomas, now called Socorro. The name of the group is derived from Capt. Colnett, in 1793, who gave the name of the Spanish Mexican Viceroy to them, in gratitude for the kindness he had received from him during his captivity.—(Colnett, p. 116.) It was intended by the Spaniards to form an establishment on them, but their natural character prevented this.

SOCORRO or SANTO TOMAS is about 8 leagues in length N.W. and S.E., and about 3 leagues in its greatest breadth. It may be said to consist of one mountain (about 2,000 feet high), which may be seen at the distance of 20 leagues, and falls in gradual descent at all points on the South side. It is in a great measure covered with brushwood, intermixed with low prickly pear trees (*cacti*), and occasionally shaded with other trees of a larger growth. Some few spots of the

* It does not follow, therefore, as a matter of course, as noticed by some writers, that the appearance of birds denotes land to windward; they are more likely guided by tide.

† Sir Edward Belcher, vol. i. pp. 255—257.

‡ Krusenstern, vol. ii. p. 58.

§ Nautical Magazine, December, 1848, p. 641.

soil are black and barren, as if fire had lately issued near it; and the top of the high land at a distance has the appearance of there having been formerly a volcano; the surface is of a whitish colour, like that of the pumice stone, which was found on the shore. Neither fire nor smoke were, however, seen to issue from the island.

The vegetables found by Colnett's people were considered as wholesome; they were beans, and the molie tree, whose leaves make a pleasant and aromatic decoction. The prickly pear, an excellent antiscorbutic, grew in great abundance. Numerous land-birds, and plenty of sea-fowl, also afforded food. Fish is very abundant, but difficult to take, on account of the numerous sharks. Water is, however, not to be found, though there are many indications that some must exist, but they have not been discovered.

Capt. Colnett considered the safest anchorage, from June to December, to be between the South and S.W. points (*Cornwallis Bay*), opposite to two white coral beaches, which are the first two in succession from the South point of the island toward the West. It is remarkable from the pinnacle rocks, which lie close off the West point of the bay. This bay is preferable in the bad season, as the wind seldom blows more than two points to the southward of East. In the good season, however, that is, from the latter end of December till the beginning of June, the S.E. (or *Braithwaite Bay*) is to be preferred; the anchorage here is better and nearer to the cove, and is the only good landing-place. It is readily known, being a stony beach at the first inlet in the shore to the eastward of the South point. All other parts of the coast on the South side of the island are iron-bound, which makes it difficult, if not impossible, to land, except in very fine weather.*

Socorro has been correctly placed on the charts by Capt. Sir Edward Belcher. He found its latitude correct; but that it was 52 miles East of its proper position by former observers.

"It is lofty, making in several peaks, the highest probably 2,000 feet above the sea. The eastern coast is very dreary and forbidding.

"Braithwaite's Bay (which was supposed to be that so named previously) has rocky landing, the shores of lava coulé, and nothing like a beach. Neither wood nor water visible, although, from the constant clouds which hang over the high peaks, there must be a supply in some other point. Lieutenant Wood examined the western bay, which is spacious: goats were observed, but no indications of wood or water visible, though, from the presence of animals, it is probable that they find water.

"It is difficult to penetrate into the interior, even for a few hundred feet, owing to the abundance of the *cactus opuntia* (prickly pear), which make those who attempt it suffer for their curiosity. One of the crew of the *Sulphur* made himself ill from eating a large bean, which grew abundantly; but it might have been from indulging too freely, because some were cooked and eaten without injury."† Two of Colnett's people were affected in the same way.

* Colnett's Voyage, pp. 85—90; 106—121.

† Sir Edward Belcher, December, 1839, vol. 1. pp. 348-9.

The landing place in Braithwaite Bay is in lat. $18^{\circ}43'14''$ N., lon. $110^{\circ}54'15''$ W.; variation, 7° E.

ST. BENEDICTO ISLAND is the same which was called *Nublada* (cloudy) by Villalobos, in 1542. Colnett calls it *San Berto*. It lies to the N.N.E. of Socorro, 30 miles distant. It is about 6 miles in length N.E. and S.W., and 2 or 3 in breadth, with a few rocks just appearing above water off different parts of it. Its surface is uneven, and its appearance romantic, but barren, with little or no vegetation. At the distance of 9 or 10 miles it appears like two islands. On the West side is a small bay, but it was not examined.* Its North end is in lat. $19^{\circ}22'40''$, lon. $110^{\circ}44'$ W., according to Colnett's chart.

ROCA PARTIDA lies 48 miles E.N.E. of Socorro. It is a dangerous barren rock, lying N.N.W. and S.S.E. by compass, 50 or 60 fathoms long, and 25 or 30 fathoms broad. Both ends are 15 or 20 fathoms in height. The N.W. end is forked; the S.E. end is like a ragged haycock. The two bights are separated by a ragged saddle, that rises 20 or 25 feet nearly perpendicularly from the sea. There is a depth of 35 fathoms at a boat's length off all round; at half a mile distance, 50 fathoms; and then no bottom with 100 fathoms. It shows itself on every bearing, at all distances, like a sail under a jury mast. There is a great quantity of fish, but the sharks prevent them being taken. The only inhabitants of the rock are man-of-war hawks, as at St. Benedicto. Lat. $19^{\circ}4'30''$, lon. (corrected) $112^{\circ}4'0''$ W.; variation, 7° E.†

SANTA ROSA or CLARION ISLAND.—We have no early account of this island, and its existence was doubted until it was seen in 1815, by Lieutenant Ponnafidin, of the Russian Company's ship *Souvoroff*, who calculated its position as lat. $18^{\circ}28'$ N., lon. $115^{\circ}6'$ W. Capt. Fitzgerald, of the *Alert*, saw it in his passage from Callao to San Blas, and placed it in lat. $18^{\circ}24'$, lon. $114^{\circ}33'$ W. Sir Edward Belcher places *Sulphur Bay* on its South side, in lat. $18^{\circ}20'36''$, lon. $114^{\circ}40'19''$. Capt. Fitzgerald describes it as being high in the West part (1,500 feet according to Sir E. Belcher), and about 6 miles long in an East and West direction. When it bears to the N.E. it shows in three summits, which give it the appearance of a group of isles. The South side is clear and steep-to, and the sea beats strongly against it, except in one part, towards the middle, where the shore is sandy, and on which the captain landed with some difficulty; at less than a mile off this part the depth is 11 fathoms.

It has also been seen by an American (Capt. Clark, of the ship *Pearl*), who has modestly bestowed the name of *Clarion* on it. It is also called *Cloud Island* on some charts, but this is evidently the name of Nublada Island to the eastward. It is also probably the same as *Best Island*, placed near to Cloud Island.‡

Sir E. Belcher speaks thus of it:—Clarion Island differs slightly in its features from Socorro, excepting that a whitish coloured fresh-water lake was found at the beach, and birds were more numerous, viz., the gannet, frigate pelican, several varieties of boobies, of tern, ducks, and doves. The plants were more luxuriant, the cactus particularly so, but not so uncourteous as at Socorro—it did not entirely stop the way. No streams were noticed.

* Colnett's Voyage, p. 107. † *Ibid.* p. 89. ‡ Krusenstern, vol. II. p. 28; Supp., p. 112.

Fish were very numerous, and took the bait freely; but they broke the hooks. Turtle were plentiful, two were captured.

Capt. Sir E. Belcher was not fortunate enough to find wood or wholesome water in any way to justify a vessel seeking for those necessities at these islands. Possibly distress might be relieved, but nothing beyond.* He sought for the several islands reported in the Socorro and Clarion groups, and passed over the position of Best's Island, which, if it existed within 10 miles, might have been seen; he soon after sighted Clarion Island, not far out of its position as given. Birds, principally gannet, together with broad patches of weed, at times plentiful.

ROCA CORAL, ROCA PARDERO, NEW ISLAND, MISIPI ISLAND, &c.—Several islands under the foregoing names have been announced as existing between lat. $16\frac{1}{2}^{\circ}$ and 17° N., lon. 133° and 136° W., but the reports have never yet been confirmed, and their existence, whether as referring to a single island, or a cluster of five islands, as has been reported, or a series of detached islands, is still doubtful.

Capt. Sir Edward Belcher, in the *Starling* and *Blossom*, sought for this cluster of doubtful islands unsuccessfully; but numerous indications of land were met with, medusæ, floating sticks, frequent showers, frigate birds, &c. "As these latter birds do not go far from land, I am disposed to believe some one of these reports to be well founded, but the position erroneously determined. So many assertions can hardly rest on imagination."†

JOHNSTON ISLANDS were discovered, December 14, 1807, on board H.M.S. *Cornwallis*, Capt. Charles James Johnston. The discovery and place of the group were announced by Lieutenant William Henry Smyth, at that time an officer on board the *Cornwallis*,‡ hence the group is sometimes called by the name of the frigate. The original observations place them in lat. $16^{\circ} 53' 20''$ N., lon. $169^{\circ} 31' 30''$ W. They are described by Wilkes, 1840, as a lagoon surrounded by an extensive reef, extending N.E. and S.W. 10 miles, and 5 miles broad; on the N.W. side are two low islets; the westernmost, in lat. $16^{\circ} 48' \text{ N.}$, lon. $169^{\circ} 45' 36'' \text{ West}$, is covered with bushes, but no trees; the other is only a sand-bank. This reef lies deep.§

SMYTH ISLANDS, a small group, are the subject of some doubt as to their original discovery. On the early Spanish charts, an island, *Gaspar Rico*, is placed between lat. 15° and 16° N., and lon. 170° E. In 1625, the Dutch fleet, called the Nassau fleet, passed near to a low island, which they believed to be Gaspar Rico. In 1796, Don. E. Quintano, in the Spanish ship *Maria*, discovered a group of five small islands, connected by rocky banks, which he believed to be San Bartolomeo, discovered by Salazar in 1536.

Whether these several discoveries refer to the same or different spots is not as yet determined; but on December 22, 1807, H.M.S. *Cornwallis* passed to the

* Voyage of the *Sulphur*, vol. i. pp. 348—350.

‡ See Purdy's Tables, 1816, p. 156.

† *Ibid.* vol. i. pp. 148—150.

§ Narrative U.S. Ex. Ex., vol. v. p. 268.

northward of a group of islets and rocks extending 17 miles from N.N.W. to S.S.E., the centre of which was in lat. $14^{\circ} 30' 30''$ N., lon. $168^{\circ} 42' 15''$ E., from the observations of Lieutenant William Henry Smyth, a name since deservedly celebrated. The largest of the islands received the name of *Sybilla*; the southernmost, *Petrel*; the others *Fruitful*, *Danger*, and *Rabbit Islands*. The northernmost part of the rocky reef was named the *Rocks of Scylla*.*

Capt. Kotzebue saw these islands March 17, 1817, and sailed along their West side. His description entirely accords with that given by Lieutenant Smyth and Capt. Quintano. His determination of their position is, for the centre, lat. $14^{\circ} 42'$ N., lon. $169^{\circ} 3' 30''$; but he concedes the difference, 21', between his own calculation and that of Lieutenant Smyth, to the latter authority.

WAKES ISLAND was discovered by the *Prince William Henry* in 1796, and its position, &c., fixed by Capt. Wilkes in 1840. It is a low coral island of a triangular form, and 8 feet above the water. It has a large lagoon in the centre, filled with a variety of fish, among which are some fine mullet. No fresh water, no palm nor cocoa-nut trees. From appearances, the island is at times submerged, or the sea makes a breach over it. Low water at 1^h on the moon's last quarter. The reef around is very small. Lat. $19^{\circ} 10' 54''$ N., lon. $166^{\circ} 31' 30''$.

It is very probable that *Halcyon Island*, said by Kotzebue to have been discovered by an American captain, is the same as Wakes Island, because Capt. Wilkes passed by its assigned position without seeing it. Krusenstern calls Wakes Island by the name of Halcyon, on this supposition.†

SAN BARTOLOMEO ISLAND; MANUEL RODRIGUEZ REEF.—An island was discovered, in 1536, by Torito Alonzo de Salazar, called S. Bartolomeo, which is placed on Admiral Espinosa's chart in lat. $15^{\circ} 10'$ N., lon. $163^{\circ} 43'$ E., without stating upon what authority. In the memoir of Admiral Espinosa, the Manuel Rodriguez Reef is placed in lat. $11^{\circ} 0'$ N., lon. $141^{\circ} 17'$ W.;‡ but these indications are so vague that no dependence can be placed on their accuracy. It is sufficient here to mention them.

MARIANA OR LADRONE ISLANDS.

The archipelago of the Marianas or Ladrone is composed of a chain of volcanic islands, which extend in a North and South direction for a space of 140 leagues. Magalhaens, the first circumnavigator, discovered them on March 6th, 1521, but he only saw Tinian, Saypan, and Aguijan. His companions in the voyage named them the "Islands of the latteen sails" (*Islas de los velas latinas*), on account of the triangular form of the sails carried by their prahus. The Spaniards named them also *Ladrones*, from the great propensity to thieving evinced by the natives,

* A plan drawn up from the observations then made will be found in Mr. Purdy's Tables, attached to the *Oriental Navigator*, 1816, p. 154, and an account of them in the *Correspondence Astron. du Baron de Zach*, vol. iv.

† Krusenstern, vol. ii. p. 48; Supp., p. 114; Wilkes's Narrative, &c., vol. v. p. 268.

‡ *Memoires d'Espinosa*, tome ii. p. 12.

although Father Gobien, who wrote a history of the archipelago, states that they hold this vice in detestation. Antonio Galvaom mentions them under the names of *Los Jardines* and *Los Prazeras*, or Pleasant Islands.

It was in 1668 that they received the name of Marianas, in honour of the widow of the King of Spain, Philip IV., Maria Anna of Austria. This name has been continued to the present day, and has nearly absorbed all others given previously. In 1664 or 1665, Andreas Miguel Lopez Legaspi came hither, and proclaimed them to be the possession of the crown of Spain, but he stayed here but a very short time.

The advantage which these islands afford to the Spaniards, by their situation on the grand track from Acapulco to Manila, and the facility in procuring fresh provisions and water here, soon induced them to take actual possession of them. Under the pretext of converting the natives to the christian religion, they founded, in 1668, in the Island of Guahan, a mission under the direction of Padre de Sanvitores, which soon extended its influence over the other inhabited islands. The mutual good understanding, however, did not last long between the missionaries and the natives, who after some months had elapsed began to revolt against them. The discontent daily increased; the baptizing particularly annoyed them; and the death of an infant, which followed soon after the ceremony, made them believe that it was an inevitable consequence of baptism, and this led to a complete outbreak. They attacked the fort, and killed several of the Spaniards, but European discipline and fire-arms prevailed, and they were obliged to yield. The war of extermination and the emigration to other islands so destroyed the population, that when Dampier came hither in 1686, that is, eighteen years after the arrival of Padre de Sanvitores, there were not more than 100 natives on the island. Dampier says that the number had been 400, but the Spanish authors magnify them into 40,000, probably a great exaggeration. It was not until 1695 that all resistance was quelled, which proves that up to this date the natives had not abandoned the hope of recovering their independence; but an epidemic finished the work of destruction, and when Anson visited the Island of Tinian, in 1742, he found it entirely deserted. This island, which once had a population of 30,000 men, was now only inhabited by wild hogs and cattle. The reports of Sanvitores, also, would confirm the estimates of the population. He says, among other things, that during the first year of his labours he baptized 13,000 people, and converted 20,000; but this must be overrated. At the present time all the islands are nearly uninhabited, with the exception of Guahan, the population of which, according to Malespina, amounts to 4,000 people, but he does not say how many of these are of the primitive race. According to Kotzebue, there was but a single couple in 1817, at the death of whom the indigenes would become extinct. The last-named author also tells us that the Americans, who trade in peltry between the N.W. coast of America and China, had formed an establishment on the Islands of Saypan and Grigan. For this purpose they had brought some families of Sandwich islanders to cultivate the land and raise live stock; but as soon as the Spaniards heard of this, they sent thither a detachment of soldiery to the infant colony, who destroyed the plantations, and carried with them the Sandwich islanders as prisoners. M. Chamisso, the naturalist in Kotzebue's

expedition, has given a detailed account of this enterprise, undertaken in 1810, by Capt. Brown, of the American ship *Derby*.

The most complete nautical account and chart of the archipelago is that drawn up by M. de Freycinet, who surveyed a portion of the southern part of the group in the French corvettes *L'Uranie* and *La Physicienne*, in 1819.* Prior to this, although they had been frequently visited, they were but imperfectly known. To this source, then, and to the narratives of the older voyagers, we are indebted for our account.†

It has been stated that the islands are entirely without inhabitants, with the exception of Guahan, the southernmost; this is not strictly the case, but the few people found only on two or three of them almost warrants the assertion.

At the period of D'Urville's visit in 1839, the population of Guahan was estimated at 5,000 souls, and idle ones too. It is garrisoned by 150 soldiers, *indios* of Manila, or natives. The fortifications are very bad, and might easily be taken. Altogether, they are very unimportant as a colony to Spain, from their being at the greatest distance of all her possessions.

The island next in importance to Guahan is Rota, which is governed by a military Indian alcade. Several natives of the Carolines, who escaped from the floods occasioned by a hurricane which completely overwhelmed their islands, came to Saypan, where they fixed themselves, with the consent of the governor.‡

The primitive inhabitants of the archipelago have left some memorials of their talent behind them, like those of the now-forgotten monuments on Easter Island, at the opposite extreme of the Pacific Islands. In Tinian these structures are remarkable. They are described in Lord Anson's Voyage, where a view is given of one, and are mentioned by other and later visitors. Lieutenant Mortimer says they consisted, in the state he saw them, of two ranges of columns, either of stone or composition, and of a pyramidal form, 5 feet 4 inches broad at the base, and 14 feet high, having large semi-globes, 5 feet 10 inches in diameter, placed on the tops, with their flat surfaces upwards.§ These singular structures, which are not all exactly alike, are supposed by Freycinet to be the supports of a wooden ceiling to which the roofs of the principal houses were affixed. In the Atlas Historique accompanying his Voyage, the views and restoration of these are given (plates 73, 74, 75, 81).

WINDS AND CURRENTS.—Admiral Krusenstern makes the following observations on this subject:—The Marianas lie in the region of the North tropic, and consequently in that of the N.E. trade-winds. But this is not the prevalent wind. The N.E. and S.W. monsoons, which are met with in the China sea, on the coasts of China, and near the Philippine Islands, extend as far as the

* Freycinet's Voyage, Paris, 1826; Navigation et Hydrog., chap. xi. pp. 190—221.

† The accounts of the progress of discovery in this group will be found in *Herrera*, decad. 3, l. 7, et seq.; *Argensola*, Conquista de las Molucas, lib. i.; *Gonzales de Oviedo*, Hist. de las Indias; *Gomara*, Hist. Gen. de las Indias; *Ultimo Viage al Estrecho de Magalhaens*, p. 205, &c.; *Anson's Voyage Round the World*, by *Richard Walter*, book iii. chap. 2; *Byron's Voyage*, in *Hawkesworth's Collection*, vol. i. p. 116, et seq.; *Wallis's Voyage*, *ibid.* vol. i. p. 279, et seq.; *Portlock's Voyage*, p. 317; *Gilbert's Voyage of the Charlotte*, 1788, pp. 66-7; *Voyage of Governor Phillip to Botany Bay*, 1789, p. 245.

‡ *Voyage de L'Astrolabe et Zélée*, tome v. pp. 202—336.

§ Observations, &c., on a Voyage to Tenerife, N.W. America, Otaheite, Tinian, and to Canton, in the brig *Mercury*, commanded by J. H. Cox, by Lieutenant George Mortimer, 1791, p. 64, et seq.

Marianas, and sometimes even beyond them; so that the limits between the monsoons and the trade-winds must be found somewhere near this archipelago, as is explained in a subsequent page, in treating of the winds and currents.

The currents generally following the direction of the winds, it is probable that it is also the case near the Marianas. But Capt. Golownin met with a rapid current bearing to the N.E., although the wind blew from that quarter; and a Spanish officer affirms that a similar current generally flows in this part; but this phenomenon may proceed from some local cause, and is but an exception, and does not affect the general rule.

Between the Islands of Tinian and Aguijan a violent current was remarked in the *Centurion*, the direction of which was alternately S.S.E. and N.N.W. This would prove the existence of regular tides. The flood, which bore to the N.N.W., was more rapid than the ebb, and lasted longer. Pasco-Thomas also remarked, that during the syzygies the flood was 2 feet less than at the quadratures, which is contrary to what usually occurs. The greatest rise of water was 8 feet; with S.W. winds the flood rose higher than with other winds.*

Observations on the Winds, by M. de Freycinet.—"We remarked that in April and May the wind at the Island of Guahan almost always blew freshly from E.N.E. to E.S.E. It sprang up at break of day, became very fresh towards 8 or 10 o'clock, A.M., and was calm during the night. The sky was most generally clear; sometimes it was overcast with thick clouds, which, driven with great rapidity, gave place to showers and strong gusts.

"When the horizon was overcast to the S.W., the N.W., and West, with a black mass, not high, the sea began to break on the inner banks at the Luis Harbour. It also occurred that, notwithstanding the continuance of the easterly winds, the S.W. and westerly swell render the narrow passages between these reefs impracticable. During our stay, storms accompanied by rain were very frequent, but of short duration. Thunder was never heard.

"The monsoons are felt at the Marianas; that from the West takes place from the middle of June to the middle of October. The wind, however, does not blow violently but for three months of the year. Hurricanes are rare, but are not unknown; nor are earthquakes, which, on the contrary, are tolerably frequent. Of the first-mentioned scourges there had not been one for seven years prior to our visit.

"According to Don Luis de Torres, the months of July to November are the season of bad weather, storms, thunder, and rain; and in December, January, and February, the weather is variable; March, April, May, and June, are the finest; the breeze then comes from East and N.E. The months when the winds blow strongest are August, September, October, and November; they blow at these periods from N.W. to S.W. by W., sometimes from South and S.E., but in general rather between North and West than from North itself."†

GUAM,‡ or GUAHAN, or GUAJAN, is the southernmost and principal of

* Burney's Chronological History, &c., vol. v. p. 72.

† Freycinet, pp. 220-1.

‡ Guam is spelt in the Atlas Historique of Freycinet's Voyage, Guam, the *u* being equivalent to the diphthong *ou*. Most of the words usually spelt with this, the Italian *u* or English *oo*, are thus written in the excellent map in question.

the Marianas, inasmuch as it is the seat of government, and is also the largest of them. Besides this, it is the only one inhabited to any extent. It is about 29 miles in length, in a N.E. $\frac{1}{4}$ N. and S.W. $\frac{1}{4}$ S. direction, and 3 miles broad. It is bordered throughout a greater part of its circuit with a chain of reefs, which are uncovered at times. Excellent old Dampier thus describes the island :—" At a distance it appears flat and even, but coming near it, you will find it stands shelving, and the East side, which is much the highest, is fenced with steep rocks, that oppose the violence of the sea, which continually rages against it, being driven by the constant trade-wind, and on that side there is no anchoring. The West side is pretty low, and full of small sandy bays, divided with as many rocky points. The soil of the island is reddish, dry, and indifferently fruitful. The fruits are chiefly rice, pine apples, water-melons, musk-melons, oranges and limes, cocoa-nuts, and a sort of fruit called by us bread-fruit.

"The cocoa-nut trees grow by the sea on the western side in great groves, 3 or 4 miles in length and 1 or 2 miles broad."

It was surveyed by M. Duperrey, under the orders of Capt. Freycinet, in 1819; he went round it in a boat; and in the Atlas attached to the Voyage of *L'Uranie*, are some excellent and detailed plans. From that description we make the ensuing abstract :—

UMATA BAY is about 2,000 feet deep in an E.N.E. direction; its two extreme points are 1,700 feet apart. The South coast is mountainous from *Cape Chalan Aniti* to the bottom of the bay, where the *River Umata* or *Saloupa* enters. It is the usual watering place. The North coast is low, and the town stands here. The church, built at the foot of the mountain, fronts the eastern part of the bay; a small rivulet, the *Sabo River*, flows between the church and the governor's house. Behind the town the hills rise in an amphitheatre, and are neither high nor remarkable. On the South side of the bay, on the contrary, the *Inago Mount*, opposite the governor's house, is remarkable; and farther West is another of 120 or 130 feet high, on the summit of which is the fort of N. S. de la Soledad. Between these two hills a rivulet of excellent water flows, called the *Chioreto*.

Point Tougouéne really forms the South extremity of Umata Bay. It is low, pointed, and guarded by a chain of reefs, which approaches Cape Chalan Aniti within a cable's length. To the North of the bay is an isolated and picturesque rock, on which *Fort Sant. Angel* is built. It is approached by steps cut in the rock. About 100 fathoms from it, to the North, is another, *Fort San José*. A battery at the bottom of the bay opposite the church is called N. S. del Carmen. Forts San José and N. S. de la Soledad are plainly discernible by their whiteness. Umata Bay is perfectly sheltered from North and South round by East; but in the season of westerly winds, or from June to September, it is imprudent, or perhaps impossible, to remain here, on account of the heavy sea sent in.

The coast trends to N.W. $\frac{1}{4}$ N., from the Bay of Umata to *Point Fucpi*, lat. $13^{\circ} 19' 50''$ N., lon. $144^{\circ} 50' 30''$ E., forming several sinuosities in the space, the deepest of which is *Cetti Bay*, as large as that of Umata. *Point Fucpi* is remarkable for being pointed, projecting, and terminating in an isolated rock joined to the shore by breakers, uncovered at low water. Thence to *Point Oroti*, the West point of the peninsula of the same name, the coast presents a bay of

6 miles opening and 2 miles deep, in which are several coves and islets. The town of *Agat* is at the bottom of this bay. Landing is impracticable on the coast here, but the land appears to be very fertile and pleasant.

PORT SAN LUIS D'APRA.—From Point Oroté to the North, and near to which point is a small island, the coast trends first E. by S., then S.E. by S. to the village of Apra; thence it turns to the E. and N., forming a large indentation nearly in the shape of a V, the opening of which is partially covered by a long and narrow island, a mass of coral, *Cabras* or *Apapa Island*, and numerous reefs. The bay is very extensive and safe, but has a great many banks, rocks, and islets. The North side is still farther contracted by the continuation of Apra Island in the form of a line of reefs, the *Luminan Reefs*, and the *Calalan Reefs*, which come within the third of a mile of Oroté Island, leaving a very deep channel, the usual entrance. The whole of Oroté peninsula is madreporic, and cannot be traversed, on account of the prodigious number of rocks and precipices which cover it. At the isthmus connecting it is the village of Apra, with a rude landing place. In the centre of the basin is a rock level with the water, on which the *Fort of Sta. Cruz* is built. It is in lat. $13^{\circ} 25' 45.3''$ N., lon. $144^{\circ} 52' 27''$ E. The anchorage usually occupied by ships is to the North of this, and is a basin surrounded by coral patches of 2 or 3 feet beneath the surface. The channels leading to it are frequently narrow, the last before entering the basin not more than 120 yards wide. The banks are very steep-to, and may be approached almost to touching. The depth in the anchoring ground is from 5 to 15 fathoms, muddy bottom.

The distance between Apapa Island and Cape Oroté is $2\frac{1}{2}$ miles in a W.S.W. direction; but a coral bank, which extends off Apapa Island towards the West, contracts the passage to one-half the width, which, besides this, is made still more difficult by a shoal lying precisely in the middle of the passage. A vessel, richly freighted from Acapulco, had struck on it a short time before the arrival of Capt. Kotzebue. But as there is a good passage on either side of this shoal, half a mile in breadth, this entrance would be scarcely dangerous, if care be taken to mark its two extremities with buoys or flags. The depth in the passage to the N.E. of the bank not being more than $5\frac{1}{2}$ fathoms, coral bottom, Capt. Kotzebue advises ships to pass by the channel S.W. of the bank, and to keep as close as possible on the Oroté side, where the depth of water is sufficient for the largest ships. After passing beyond the bank a basin is entered, where anchorage may be taken if circumstances demand it, but as the water in it is of a very great depth, and the bottom is bad, it would be better, if the wind and tides allow, to keep on the course to the inner part of the harbour, where you may anchor at the distance of a quarter of a mile off the small Island of Santa Cruz in 15 fathoms. At the period of Kotzebue's visit, in 1817, there was a battery of three six-pounders on this island.

From the entrance of the port to the Island of Santa Cruz the distance is 2 miles; it would perhaps be dangerous to attempt to beat in or out against a contrary wind, as Kotzebue did; it would be more prudent to wait for the West wind, which springs up every morning at daybreak, and to tow through the narrowest part of the passage. A small river falls into the harbour at three-quarters of a mile from Santa Cruz Island, and this is the watering place; but

the boats ought to be sent at high water, because at other times it would be difficult to reach the mouth of the river. The casks are filled at low water, and you wait for high water to get off again.

Leaving San Luis, the coast runs to the E.N.E., and then North, to *Point Acabi-Fanahi*, a perpendicular rock, near to which lies the small Island of *Gapan*. The reefs from Apra Island reach to the latter. A mile and a half from Point Acabi-Fanahi is *Point Adeloup*, better known to the inhabitants as *Punta del Diablo*, on account of the extreme rapidity of the currents, which make it very difficult to be doubled. A sandy beach commences immediately after Point del Diablo, which trends to the East and North, forming the *Bay of Agagna*, in the middle of which is the small Harbour of Agagna, only fit for small ships. *Aloupan Island* forms the N.E. extremity of this bay; it nearly touches Point Apurguan, and makes apparently a secure anchorage, but it is too shallow except for small boats.

The coast from the last point to *Point Toumoun*, is of steep rocks, and all the detached points hence to the northward of the island are absolutely alike. Two miles and a half to the N.E. of *Point de los Amantes* is *Toumoun Bay*. It appears to be filled with reefs, but there are several passages through it, where boats can reach the shore, and land without difficulty. Towards the East extremity of the bay, near its middle, and to the South of the village of *Gnaton*, a cross has been erected to the memory of Padre Sanvitores, the martyr of the Marianas, who was killed on this point by a native chief.

From Point de los Amantes to Point Niigo the coast trends N.N.E.; it is barren and uninhabited. Above this latter point is the exposed anchorage of *Falcone*.

POINT RITIDIAN is the N.W. point of Guam; it is in lat. $12^{\circ} 38' 54''$, lon. $145^{\circ} 4' 39''$ E. A short distance inland the perpendicular madreporic hills form, scarcely without interruption, the circuit of the island. The coral reefs trend to the S.E. to *Point Taqua*, forming the shore. To the East of this the land trends East a mile to *Point Patay*, the N.E. point of the island.

The eastern coast of the island, as far as Tarafofo Harbour, offers no shelter to the navigator. It therefore ought to be avoided during the eastern monsoon. The only openings are *Pago Harbour*, in lat. $24^{\circ} 30'$, accessible only for boats, and *Ylic Bay*, 2 miles to the southward, and equally unimportant.

TARAFOFO HARBOUR is formed of two small, deep bays, the first of which, *Tarafofo*, is open to the East, in which direction it is half a mile long, and 300 yards wide. The other is smaller, and is called *Paicpouc Bay*. The *Tarafofo River*, the most considerable in Guam, enters the head of the bay. Madreporic hills, very steep, descend on both sides of the harbour to the water. That of Mabilouc, on the North side, is celebrated in the history of the country. There is no village near the harbour, but at a sort of farm near the South they raise cattle. Tarafofo is the only harbour, next to San Luis, which will receive vessels at all seasons of the year. There are no rocks in it, nor is there any danger. A point at the head of the bay, on the South end of the sandy beach, is in lat. $13^{\circ} 18' 9''$ N., lon. $144^{\circ} 58' 56''$.

From Tarafofo to *Hounlodgna Bay* the land is low, with sandy beaches and rocky points. The bay is only fit for small boats; *Ynarahan Bay* is a quarter of a mile wide in the opening, and half a mile deep. It is open from East to South.

During westerly winds a vessel would be perfectly safe in it, but not with the opposite. The town of Ynarahán is on its South side. Point Goal, on the North side of the entrance, is in lat. $13^{\circ} 16' 30''$ N., lon. $144^{\circ} 58' 0''$ E.

Agfayan Bay is three-quarters of a mile from Ynarahán Bay, and is smaller than that. It may have good anchorage for less than 15 or 20 feet. Its mouth is to E.N.E.; at the bottom is a small brook, where boats can readily procure water.

AHAYAN POINT and BAY are at the S.E. point of Guam. The point is in lat. $13^{\circ} 14' 0''$ N., lon. $144^{\circ} 56' 40''$ E. The bay is singularly obstructed by reefs, so that it is impossible to approach it if the sea beats on shore.

The South end of Guam is an uninterrupted sandy beach fronted with reefs, having two or three small islands on it. *Cocos Island*, formerly called *Dantono*, and near to it *Bali Island*, extend off the S.W. point of Guam. It is a mile long, low and barren, with some trees, among which is a *single* cocoa-nut tree, which gives its name. It is surrounded by reefs, which extend to the northward from between it and the actual S.W. point of Guam, the small *Harbour of Marizo*, fit only for small vessels.

REFRESHMENTS.—Vessels coming to Guam cannot find every necessary for a ship's provisions, but daily supplies may be had in abundance. Pork, poultry, dried fish and beef, fresh venison or beef, cabbage, palu, rice, maize, palm, brandy, yams, and sweet potatoes, are among the number. Freycinet speaks highly in praise of the courtesy and hospitality of the officials.

The SANTA ROSA SHOAL lies to the southward of Guam. Admiral Krusenstern mentions it with some doubt as to its existence, but of this there is no question. Dampier saw it in 1686, on approaching the island. "They sailed over a rocky shoal, on which there was but 4 fathom water, and abundance of fish swimming about the rocks." The Spanish galleon, too, arrived from Acapulco while he lay at Guam; but avoiding Dampier's ships, sailed to the southward, and struck on this shoal, and was in great danger of being lost there, for she struck off her rudder, and could not get clear till after three days' hard labour.* It must be at a considerable distance off, for after some hours' sail they sighted Guam, 8 leagues distant. On Cantova's chart it is made 20 leagues in extent, E.N.E. and W.S.W., and about half as broad. On Mr. Dalrymple's chart, a bank, discovered in 1740 by Galvez, is made to be 10 miles to the S.W. of Guam, in lat. 13° ; but this has not since been found; an American vessel, among others, passed over the site in 1804, without finding bottom. This may be the same as that mentioned by Dampier, but is probably not of the extent delineated by Cantova.

Its position may be about lat. $12^{\circ} 30'$ N., lon. $144^{\circ} 15'$ E.

ROTA ISLAND (ZARFANE or SARFAN ISLAND) lies N.E. $\frac{1}{2}$ N. 10 leagues from the North end of Guam. Its dimensions are 4 leagues from N.E. by E. to S.W. by W., its breadth $5\frac{1}{2}$ miles. It is hilly in its East and North portions, particularly so in the centre, but becomes lower, in the form of an amphitheatre, to the S.W., to a low and sandy isthmus, where the villages of *Sossan Hagno* and

* Dampier's Voyage, vol. i. pp. 283—303.

Sossan Haya are built. To the S.W. of this isthmus is the S.W. point, a hill terminating in a level and very regular plateau. The highest part of Rota is not less than 180 to 200 feet above the sea.

The S.E. end of the island is tolerably high and perpendicular on the sea-shore, presenting thus a straight wall, and at its angles vertical fissures like the embrasures of a fort. In other parts the land descends gradually to the sea, terminating in long and low points. The island is nearly surrounded by reefs. Its N.W. coast and the S.E. of the isthmus are bestrewn with a multitude of rocks, on which the sea breaks more or less, according to the direction of the wind. The portion of the island not inhabited is so encumbered with bushes (on the North side only are some cocoa-nut trees) that it is difficult to penetrate. Three wells furnish water to the people. Two of them are artificial, and the water is detestable; a third, which is natural, affords better, though it is brackish. On the East coast, a mile from the village, there is a rivulet of very good water.

Between the South and S.W. points of the island a large bay opens in front of the village of *Sossan Haya*; its West part is very rocky. Ships can find good shelter here against winds from East to West by the North, but the bottom is foul, therefore chain cables ought to be used.

On the West side of the isthmus a sort of stage or jetty makes an easy access for boats. Without this shelter M. Berard thinks that the low isthmus could not withstand the force of the sea. This island is inhabited, and here the manners and language of the ancient inhabitants of the Marianas are met with in greater purity than elsewhere. Some cattle, and particularly pigs, cocoa-nuts, bread-fruit, bananas, and a few other vegetables, constitute the entire riches of the island.

AGUIJAN ISLAND.—At 44 miles N.N.E. of Rota is the small Island of Aguijan. It is not more than a league in its greatest diameter. In its North part are high, perpendicular, and nearly naked rocks, but crowned with a thick wood. At a distance this island appears parched and barren, but this is not so when closer. At about a mile to the S.W. of Rota (Aguijan ?) there is a rock which unites with it. It is said that the inhabitants of Tinian formerly carried some goats to Aguijan; they may have multiplied greatly, for it is but little frequented. The only points fit for landing are on the West and N.W. sides. They are very small creeks, lined with sandy beaches. Its centre is in lat. $14^{\circ} 53' 30''$, lon. $145^{\circ} 43' 0''$ E.

TINIAN, or *BONA VISTA*, is separated from Aguijan by a channel 6 miles broad. It has been celebrated for its fertility and the prodigious quantity of cattle. It is 9 miles in extent in a North and South direction, and $4\frac{1}{2}$ miles broad. *Anson's Road*, which is on the western side of the island, close to its South point, being open, and the bottom very bad, it cannot be recommended as an anchorage, particularly between the months of June and October. Lord Anson anchored here, August 27, 1742, in 22 fathoms, on a bottom of hard sand and coral; at this position the two extremes of the island bore N.W. $\frac{1}{2}$ N. and S.E. $\frac{1}{2}$ E.; the centre of Aguijan Island, S.S.W.; the peak of Saypan Island was visible over the Island of Tinian, in the direction of N.N.E. $\frac{1}{2}$ E., and a reef of rocks lying between the vessel and the shore to E.S.E. $\frac{1}{2}$ E.

The first account of this archipelago that deserves the attention of navigators is that given by Richard Walter, the chaplain to Commodore Anson, in his voyage round the world, who came to Tinian August 27, 1742, and remained till the end of October. The frightful ravages made by scurvy in the ill-fated crew of the *Centurion*, in a previous part of her voyage, has been before alluded to. Their ill fortune had not forsaken them. They arrived here in their floating hospital, and by means of the refreshments spontaneously produced they all recovered in a week. Walter draws the picture of Tinian in the most glowing colours. The healthy and dry soil, the beauty of its natural meadows, the diversified woods and lawns, valleys and hills, abounding with herds of thousands of cattle, white with black or brown ears, in every part; guanacoës, wild hogs, exceedingly fierce, but excellent meat; wild fowls, too, in every part; its fruits, guavas, cocoa-nuts in considerable numbers, limes, oranges, and "a kind of fruit peculiar to these islands, called by the Indians *rhymay*, but by us bread-fruit," swell into a long list of luxuries to the declining mariners. The fish that were taken proved obnoxious; Walter supposes from the men eating too much, but Byron afterwards proved that it really was of deleterious quality. The island had no rivulets or running water, but springs were everywhere met with, "and in the midst of the island there are two or three considerable pieces of excellent water."* The accounts of Anson's stay, and what *they saw* in Tinian, led to very great expectation in the succeeding visitors. The *Centurion's* visit was not a very great time after the island had been depopulated by the Spaniards, to replenish the effects of sword and pestilence in the Island of Guam, the remains of the structures erected by the people, then extinct, being found in many places. These have been alluded to. When Lord Byron came here, twenty-two years after Anson, he found Tinian a very different place to what it had been described. Instead of a paradise, it was, in almost all respects, the reverse. Instead of smiling valleys and verdant lawns and meadows, the trees stood so thick that they could not see three yards from them; their clothes were torn to rags in attempting to penetrate them; all the open land was overgrown with a stubborn kind of reed or rush, in many places higher than their heads. The climate, too, was insufferably hot, the water scarce and bad, and the plague of fleas intolerable. Walter, it is true, mentions the last drawback; but Byron says they were covered with them from head to foot, nor could they open their mouths without getting them filled; swarms of scorpions, centipedes, large black ants, and other venomous insects without number. Added to this, it was found more *unhealthy* than almost any other place that they had visited. The two accounts of 1742, and Byron's in 1763, could scarcely be more opposite. Wallis, who came here in 1767, draws a picture scarcely more flattering than the latter. He says, however, that beef, pork, poultry, papaw-apples, bread-fruit, limes, oranges, and every refreshment that is mentioned in the account of Lord Anson's voyage could be got. But flesh meat could be scarcely kept sweet one day. Capt. Gilbert, who passed it in 1788, says that Capt. Wallis's account seemed to be nearest to its condition at that time; so that we may suppose that Lord Byron's picture is somewhat over-

* See Anson's Voyage Round the World, in 1740—1744, book iii., chap. 2.

drawn, as that of Walter's undoubtedly is. Lieutenant Mortimer, who came here in 1789, in the *Mercury*, got all they required, but the cattle were very wild and shy. The well near the anchorage, so much praised by Richard Walter, and so dispraised by Byron, as being brackish and full of worms, was found to be good and sweet; but this may have been the effect of season. Lieutenant Mortimer was here in December, Commodore Byron in August; Capt. Gilbert found it dry in August, 1788.

On one point all agree, that is, the badness of the roadstead; we therefore quote Richard Walter's words:—"But the most important and formidable exception to the place remains still to be told; this is, the inconvenience of the road, and the little security there is, in some seasons, for a ship to anchor. The only proper anchorage place for ships of burthen is at the S.W. end of the island; the Peak of Saypan, seen over the northern part of Saypan, and bearing N.N.E. $\frac{1}{2}$ E., is a direction for readily finding it; the anchoring place is then 8 miles distant. Here the *Centurion* anchored in 22 fathoms, about $1\frac{1}{2}$ miles off the shore, opposite to a sandy bay. The bottom of this road is full of sharp pointed coral rocks, which, during four months of the year, that is, from the middle of June to the middle of October, render it a very unsafe anchorage. This is the season of the western monsoons; when near the full and change of the moon, but more particularly at the change, the wind is usually variable all round the compass, and seldom fails to blow with such fury that the stoutest cables are not to be confided in. What adds to the danger at these times is the excessive rapidity of the tide of flood, which sets to the S.E., between this island and that of Aguijan, a small islet near the South extremity of Tinian, which, in the galleon's chart, is represented only by a dot. This tide runs at first with a vast head and overfall of water, occasioning such a hollow and overgrown sea as is scarcely to be conceived, so that we were under the dreadful apprehension of being pooped by it, though we were in a 60-gun ship. In the remaining eight months of the year, that is, from the middle of October to the middle of June, there is a constant season of settled weather; when, if the cables are but well armed, there is scarcely any danger of their being ever rubbed; so that, during all that interval, it is as secure a road as could be wished for. I shall only add, that the anchoring bank is very shelving, and stretches along the S.W. end of the island, and is entirely free from shoals, except a reef of rocks, which is visible, and lies about half a mile from the shore, affording a narrow passage into a small sandy bay, which is the only place where boats can possibly land."

- (Anson's Voyage, book iii. chap. 2.)

We have been more discursive on Tinian than its merits perhaps deserve, but as it is a point familiar in the history of navigation, it has more interest than it would otherwise claim. When Freycinet came here, in 1819, he found not more than twenty inhabitants on it. The position of the village of *Sunharom*, abreast of Anson's Road, is lat. $14^{\circ} 59' 22''$ N., lon. $145^{\circ} 49' 19''$ E., according to Freycinet.

SAYPAN or SEYPAN ISLAND, which is distinguished by a lofty peak, 2,000 feet high, is so close to Tinian that small boats pass from one to the other over the shoal water. This island is fertile, wooded, and is the largest of the Marianas, being 10 leagues in length in a North and South direction. The

direction of the western coast of Saypan, beyond the South point, is first N.W.; then it turns to the North. All this side is bordered by a reef, which, from its North point, runs directly to South to the parallel of its South extremity, where, on account of the diverging direction of the coast itself, the reef is distant 15 miles from it. The Island of Tinian occupies one-half this breadth, so that it forms here a roadstead, sheltered against all winds, except perhaps those from the South. The Spanish plans published in Dalrymple's Collection give some indications of soundings, and particularly along the reef, where the depth is 25 to 30 fathoms. Towards the middle the depth must be greater, and in consequence is not so proper for anchorage. Farther up the breadth of the road is much less, and the soundings indicate 15 and 16 fathoms, and it is here that the Spanish plans mark the anchorage. It may here be remarked that Malespina himself only examined and determined the position of Guam, Rota, and Tinian. After having related the astronomical observations, which served to determine the longitude of Umatac Bay, he says :—" We have determined by trigonometrical operations the position of the North and South extremities of Guahan, and that of the town of St. Ignacio de Agana, and the chronometric operations have given the situation of the Islands of Tinian and Rota in reference to Guahan. As for the positions and configurations of the rest of the islands, they are founded on less authentic particulars.* As the greater part of the vessels bound for Canton or Manila touch at Guahan, the southernmost of the islands, it is very natural that those to the northward should be best known."

FARALLON DE MEDINILLA is only 2 miles long, N.E. and S.W.; its breadth much less. It is a calcareous rock, flat, with perpendicular sides. It is barren, and has reddish patches. On the South and West sides are some very deep caverns or grottos. The South point is terminated by a small hill, perhaps joined to the island by low land. At its South part is a pierced rock, through which a boat might pass. Freycinet called it *Pointe des Grottes*, and the island itself after the respectable governor of Guam.

ANATAXAN ISLAND is 9 leagues N.W. of the last; it is about 5 miles long, East and West. It has two very high and steep peaks lying on the same parallel. To the S.W. only there is a small point slightly projecting. The island has every appearance of being volcanic.

SARIGUAN ISLAND, to the N.N.E. of the preceding, at 6 leagues distant, appears to be merely a high hill, of the form of an upright cone, with nearly a circular base, $1\frac{1}{2}$ miles in diameter. Its summit is rounded. It is almost without vegetation, and also seems to be of volcanic origin.

FARALLON DE TORRES.—This small island is about 12 leagues from Sariguan. It is $2\frac{1}{2}$ miles from N.N.E. to S.S.W. Its breadth does not much exceed a mile, and it is of moderate height, much resembling the Farallon de Medinilla. Its North point is the lowest; throughout it has a most barren aspect, is perpendicular, and unapproachable on all sides. Freycinet named it after Major de Torres, at Guam.

GUGUAN ISLAND is nearly exactly North of the Farallon de Torres, and

* *Memoires d'Espinosa*, tome II. p. 4.

5½ leagues distant from it. It lies North and South, 2½ miles long, and is one of the highest in the archipelago. On it are two peaks, the northern one may be 2,000 feet high. To the South and East the slope of the hills is extremely rapid, and the rock, which descends to the sea, is composed of lava. At its South end there are, however, some white and red spots, and to the West a point covered with trees; it is the only place where there are any large vegetables. The North side is not so steep as the South. The highest point on the North side is a vast crater, from whence Freycinet saw smoke issue, as was also the case with another to the N.W., at two-thirds up the mountain.

ALAMAGUAN ISLAND is almost exactly on the meridian of Guguan, in lat. 18° 4'. It was only seen at a distance of 6 leagues, at which it seemed to be divided into two portions, but they were convinced it was joined by low land. It appeared to be about 8 miles long N.E. and S.W. Its highest parts were angular; that to the N.E. was like a volcano.

PAGON ISLAND.—At 3 leagues farther North is Pagon, which was imperfectly seen through the haze. Several peaks were remarked, and towards the South a small island near the coast, perhaps attached to it. It is said that there is anchorage close to the land in the South part of Pagon, but it cannot be sheltered from those winds which blow between S.E. and S.W. round by South.

GRIGAN ISLAND.—In lat. 18° 48', to the N. by W. of Pagon, is this island, about 6 miles long, on which are seen two high peaks, apparently a former volcano. Wilkes, by an imperfect observation, made it to be 2,300 feet high. To the S.W. of the island there is, from what M. Freycinet was assured, a small plain, in front of which there is bad anchorage, on account of the violence of the currents. The Americans and some Sandwich islanders were established on this island, on the S.W. side, but were forcibly removed by the governor of Guam.

Grigan is larger than Assumption, to the North of it, and, like it, is volcanic, having a few trees on its North and South ends, which descend gradually from what appears to be the crater, having at some period deposited streams of lava, or black ashes, a considerable distance down its sides.

MANGS ISLANDS.—These are some small islets which the Spanish charts place in the middle of numerous reefs. They were seen from the *Uranie's* mast-head, and the bearing then taken served to point out their approximate situation.* This was the northernmost of the Marianas seen from *L'Uranie*.

ASUNCION (or *Assumption*) is better known. La Pérouse anchored here. It is called by Espinosa the *Great Volcano*, which is expressive of its character, inasmuch as La Pérouse considered it not to be quite extinct even in his time. It is a very remarkable object, being a perfect volcanic cone rising abruptly from the ocean to an altitude of 1,700 feet (Pérouse estimated it at about 1,200 feet). Its whole circumference at the base is not more than 3 miles.

The channel between Asuncion and Grigan is perfectly free, and 50 miles in width. When the weather is clear, both islands may be seen 15 or 16 leagues. Some islands have been placed S.S.W. of Asuncion, but it would appear to be

* Voyage des Corvettes de S.M. *L'Uranie* et *La Physicienne*, par M. Louis de Freycinet, Navigation et Hydrographie, pp. 172—221.

through an error in La Pérouse's journal, a bearing having been omitted, and South instead of North substituted. This is also confirmed by Capt. Wilkes, U.S.N.—(Vol. v. p. 267.)

The URACCAS are the small rocky islands which lie 5 leagues N. 28° W. from Assumption. They have been placed S. 28° W. from Assumption, under the second name, from the reason mentioned in the preceding paragraph.

GUY ROCK, or FARALLON DE PAXAROS, is the northernmost part of the Marianas. It was discovered by Capt. Douglas, September 12, 1789, and was placed under the second name in Espinosa's chart. Its position, according to its discoverer, is in lat. $20^{\circ} 30' N.$, lon. $145^{\circ} 32' E.$, which very nearly coincides with the position of Lieutenant Macquina, as corrected by Espinosa.

LINDSAY ISLAND.—This island was discovered by Mr. Lindsay, of the British schooner *Amelia*, during a calm, on Christmas-day, 1848. It appeared about 40 feet high, and 4 miles in length, very barren, and of a dark-brown colour. Of its position, lat. $19^{\circ} 20' N.$, lon. $141^{\circ} 15\frac{1}{2}' E.$, its discoverer speaks confidently, having proved the rate of his chronometer only two days previously at the Islands of Grigan and Asuncion.*

CHAPTER XXXIV.

THE SANDWICH ISLANDS, ETC.

THESE islands were discovered by Capt. Cook, in his last and unfortunate voyage. Proceeding from Tahiti, he made the land of Atooi and Woahoo, to the North and N.E., on Sunday, January 18, 1778. They were named by him the Sandwich Islands, in honour of the Earl of Sandwich, the then first lord of the Admiralty, under whose administration he had enriched geography with so many and splendid discoveries.

Although to Cook belongs the honour of thus making them really known to Europe, there are some proofs that they had been previously seen by the early Spanish voyagers, the first of whom was Juan Gaetano, in 1542, who made the first voyage from New Spain to the coast of Asia, though there is no account that he saw them. On the old Spanish charts there is a group marked in the same latitude, but much farther to the eastward than the Sandwich Islands; the southernmost and largest of these is called *La Mesa* (the table); to the N.E. of this is *La Desgraciada* (unfavoured); and to the N.W. is a group of six, collectively called *Los Monjes* (the monks). In the different charts of Lord Anson, taken with the Manila galleon, and those noticed by Burney (vol. v.), they are placed from 10°

* Shipping Gazette, October, 1840.

to 22° farther East than the Sandwich group. They were unsuccessfully sought for by La Pérouse, Vancouver, and others. And as the ancients determined their longitudes nearly by chance, the conclusion is almost irresistible that this group is intended for those under consideration. In this view, if the islands were seen at a distance, La Mesa would answer for the flat-topped Mowna Loa in Hawaii, and it is here now suggested that La Desgraciada would answer to Mowna Kaah; Fleuriu, who was the first to point out this subject, considered that La Desgraciada might be a separate and undiscovered island.* Los Monjes would represent the western islands of the windward group, Oahu, Maui, &c., and thus, without much difficulty, all discrepancies would be reconciled except that of longitude.

Other evidences exist of some prior knowledge of European people. Cook found in his first interview two pieces of iron,† which could only be derived from Europeans, a piece of iron hoop two inches long, and an apparent point of a broadsword. The feather head-dresses, in the form of European helmets, and the grotesque heads of the same material, which he procured, and are now to be seen in the ethnological room of the British Museum, also indicate a similar origin of ideas. Added to this, the adoration paid to Cook, as the looked-for god, combined with the other traditionary evidence, prove that some former, though nearly forgotten, intercourse had taken place.‡ Be that as it may, to Cook undoubtedly belongs the real discovery of the Sandwich Islands as now known.

It will be unnecessary to enter into the details of the progress of these islands in their early days of European intercourse.

After their discovery they were not visited till 1786, when Capts. Portlock and Dixon anchored at Oahu. La Pérouse visited Maui about the same time. Vancouver spent several months here in 1792 and 1793. He introduced the present breed of cattle, and during his stay the Island of Hawaii was ceded to the British crown. The first missionaries were landed at Kairua, in Hawaii, February 4, 1820, from Boston, United States. Some from England soon followed, and their zeal and industry soon effected a wondrous change in the character of their converts; and one most prominent circumstance arising out of it was the visit of the King Liho-Liho and his queen, with a native suite, to England, in 1822, to enter into a more close and friendly alliance with the English government. They unfortunately died soon after their arrival, and *H.M.S. Blonde*, under the command of Lord Byron, was commissioned to convey their bodies back to their kingdom, a proceeding which made a most favourable impression in Hawaii. Matters would have gone on well but for religious intolerance. The Protestant missionaries, both English and American, had increased; but in 1827 some Romish priests were introduced, who at first were kindly received, but, on their officiating, much strong feeling prevailed, and increased, until they were expelled in 1830. In 1836 the Romish propaganda again introduced themselves, but great bigotry on both sides led to most serious

* Fleuriu, *Voyage de Marchand*, tome ii. p. 21. † Cook's Third Voyage, vol. ii. p. 240.

‡ *Vide Ellis's Tour in Hawaii*, pp. 447—453; and *Jarvis's History of the Sandwich Islands*.

results, one of which is well known. At all events it gave occasion to the French government to act with very great injustice, and finally to take possession of the islands.

The most prominent circumstance in this affair is that of the *Clementine*, a brigantine under the British flag, in 1839, which was forcibly entered, and made to retain on board two French missionaries brought by her on her late voyage from California. The government endeavoured at first by bribery to effect this, but on their having recourse to forcible means, the consul advised the colours to be struck, and the vessel abandoned, and then, perhaps indiscreetly, caused the flag to be burned.

To adjust this outrage, Capt. Sir Edward Belcher endeavoured to convince the missionaries (Mr. Bingham at the head) and the king (Tamehameha III.) of the impropriety of this step. The French frigate, *La Venus*, 60 guns, appeared at this critical moment, and Capt. Du Petit Thouars acted with Sir Edward Belcher in the matter, and the missionaries were for a time landed, and an acknowledgment given that reparation should be made to the owners of the *Clementine*. After this the government and the state of society became disorganized, and after much controversy the French took possession of the Sandwich Islands, August 25, 1849. It appears that M. Dillon, the French consul, but who had not been confirmed in his office by the new republic, called on Admiral Legoarant de Tromelin, commander of the French forces in the Pacific, who arrived about this time at Honolulu in the frigate *Poursuivante*, to interfere directly with the affairs of the kingdom. A despatch was forwarded to the king, requiring him to alter the customs duties, the complete adoption of the treaty of March 26, 1846, the equalization of the Roman Catholic and Protestant religion in the schools, &c., which, not being complied with, the armed force landed on the afternoon of Saturday, August 25, 1849, and took possession of the fort, the government offices, &c., but without any resistance, declaring that the treaty of 1846 was null and void, and that it should be replaced by that concluded on July 17, 1839, between Capt. Laplace and Tamehameha III.

The NATIVES and their habits have been too often described to need much being said here. When Cook first landed, their astonishment was extreme. They were above the middle size, and well made; their complexion rather darker than those of Tahiti, and altogether not so handsome a people. Most of their former customs, so much dilated on in the early accounts, have passed away, and are generally superseded by European habits and manners, not perhaps altogether advantageous to them. They are very peaceable, friendly, and hospitable.

The estimate of Cook, in 1779, that there were 400,000, is generally believed to be much too large. Probably 300,000 would be nearer the truth. One thing is certain, that there must have been a vastly greater population then than now, as is evidenced by the rich taro land now lying waste on all the islands; and in the districts of Kau, Waimea, and Kohalu, on Hawaii, it will be very evident that three or four times the number of people must have lived to have cultivated it.

The following statistics will show that the decrease has been rapid. The population in 1823 was estimated at 142,050; and according to the census of 1832, 130,315; and from that of 1836, 108,579. The decrease appears to have been

in progress almost from the date of their discovery. One cause, at least, has added to this; the number of young men who leave the islands in whalers and other ships, and never return. The number annually afloat is computed at 4,000. At one time 400 were counted at Tahiti, 500 at Oregon, 51 at Paita in Peru, besides unknown numbers in Europe and the United States. Their wives and children, thus left to want, fall into vicious habits and destruction. Another cause is the mortality of 1848, the "year of death," when it is supposed that 10,000 were swept from the islands by the measles, hooping-cough, and influenza combined. The missionaries, however, increase.*

The *geographical position* of the Sandwich Islands is one of very great importance, and this point would be much enhanced when the two oceans are connected by a canal across Panamá, and the ports of Japan are opened. At present, in its relation to the Pacific, it stands pre-eminent. In the North Pacific there are three principal whaling-grounds; one on the equator, another near Japan, and the third toward the Russian settlements. This, therefore, is a common centre for the ships which pass from one to the other. These advantages all confer on the ports of the group in general, and Honolulu in particular, the greatest benefit; and there can be little doubt but that the last-named port will become the entrepôt of the northern portion of the great ocean.

The *climate* of the Sandwich Islands is generally temperate and healthy for a tropical region; it would appear to resemble that of the West Indies, though more temperate, being not too hot to prevent white men working, even in agricultural pursuits. From the constant nature of the wind, the temperature and climate generally vary on different sides of the islands, and from their insular character and their great elevation, the clouds are intercepted, and rain is consequently abundant in some localities, and drought the characteristic of others. Thus the North side of Kauai or Atooi is 3° cooler than the South side from this cause, and it rains nine months of the year, and from this the country is clothed in perpetual green. On the West side of Hawaii, on the other hand, rain seldom falls on the coast, and a rainy day once a year is considered remarkable. The range of the thermometer on the windward side of the islands is from 54° to 86°; on the lee side it seldom falls so low as the former temperature. The climate is healthy, none of the intertropical diseases are known, nor do fever, ague, or cholera occur.

The *PREVALENT WIND* is the usual trade-wind from N.E. to S.E. Freycinet says that they were constantly from N.E. to E.N.E., as long as they were under sail, and out of shelter of the land; but at anchor they were less regular, and seemed to be unequally subjected to the law of land and sea-breezes. It is asserted that, as a general rule, when the sea-breeze was light in the morning, that of the land was also light during the night. La Pérous found the trade-winds prevail here in the month of May; and also in his passage from Easter Island to Maui, between April and June, it was constant from S.E. to N.E. by E. The same wind accompanied him on quitting the Sandwich Islands as far as lat. 30° N.†

* Honolulu Friend.

† Freycinet, p. 243.

On the West side of Hawaii the land and sea-breezes are very regular; there are also strong North winds, but the most severe gales are those from S.W., which the natives term *kona*; these last from a few hours to two or even three days, and are followed by rain; they are seldom strong enough to injure the houses.

The TIDES are comparatively inconsiderable, and, with the heavy swell setting upon the outer reefs, difficult to estimate. Capt. Cook, or rather his successor, Capt. King, says they are very regular, flowing and ebbing six hours each. The *flood* comes from the eastward; and it is high water, at the full and change of the moon, at 3^h 45' apparent time. Their greatest rise was 2 feet 7 inches, and the water was always observed to be 4 inches higher when the moon was above the horizon than when it was below. Capt. Cook himself says in his first visit, that when at anchor off Oneeheow (Niihau), the current set strong nearly N.W. and S.E., six hours each way; it was certainly a regular tide, and; as far as he could judge, the flood came from the N.W.

The CURRENTS in the immediate vicinity of the islands were considered by Cook, from his four winter months' observations, to be very uncertain; sometimes setting to windward, and at other times to leeward, without any regularity. They did not appear to him to be governed by the winds nor other cause that he could assign; they frequently set to windward against a fresh breeze.

But whatever may be the irregularity of the current within the influence of the archipelago, a circumstance related by Vancouver incontestably demonstrates that, beyond them, they follow, at least at times, some general law. When at Atooi he saw a noble canoe, 61½ feet long, formed from a single *pine* tree, which wood does not grow on the islands. Its origin was more singular than the canoe itself. It was a tree drifted on to the East end of Atooi in a perfectly sound state, without a shake or a bruise. This circumstance of fir timber being drifted on to the northern sides of the islands is by no means uncommon, and but little doubt can be entertained that they had come from the West coast of America. This would prove, as would at once be supposed, that the usual current in the offing came from N.E.

Another circumstance also bears with great weight upon the current drifts and the direction of the winds. On a former page we have noticed the singular circumstance of the wreck of a Japanese junk near Cape Flattery, in Oregon, in 1833. About the same time, a junk laden with fish, with nine hands on board, left one of the southern islands of the Japanese archipelago for Jedo, but encountering a typhoon, was driven to sea. After wandering about the ocean for ten or eleven months, they anchored, on the last Sunday of December, 1832, near the Harbour of Waialea, Oahu. The Hawaiians, when they saw a strange people, much resembling themselves in person and in many of their habits, said, "It is plain now we come from Asia."* How far their unwilling course was regulated by current of course cannot be exactly ascertained, but it would appear probable that, being blown off to the northward, a current, relatively similar to the Gulf stream of the Atlantic, may have carried them eastward, and then within range of the south-westerly current, which drifts pine timber.

* Hawaiian Spectator, vol. i. p. 296, quoted by Sir E. Belcher.

Sir E. Belcher experienced a strong current to W.N.W. when off Honolulu, and it frequently runs at the rate of $1\frac{1}{2}$ miles per hour. These considerations must greatly influence all navigation conducted between the islands.

The archipelago consists of eleven islands, which were discovered by Cook in his last voyage; and to these may be added two small ones to the N.W., seen at later periods. These will all be described in order, commencing with the S.E.

There is very great variation between the orthography used by the early voyagers and that subsequently adopted by the missionaries on a more intimate knowledge of the language. The latter mode is, of course, to be considered as the correct one, and is that placed first in these pages.

HAWAII, the south-eastern, and by much the largest of the group, is called *OWHYHEE* by Cook and others. Kotzebue calls it *O Wahi*; Freycinet and others, *Owhyhi*. All these words are representations of the same sound.

Hawaii is of a triangular form; the West side, running generally North and South, is 100 miles in length; the N.E. side is 84 miles, and the S.E. side is 64 miles long; so that its whole circumference may be taken as 250 geographical, or 288 British statute, miles.

The mountains of Hawaii do not ascend in peaks, like many other volcanic islands, as Eimeo or Teneriffe, but rise gradually and comparatively unbroken, particularly from the southern shore to the lofty summit of Mauna Loa. Its appearance altogether is less romantic and picturesque than Tahiti, but it is more majestic and grand.

There are but few inland settlements on the East and N.W. parts of the island, but in general the interior is an uninhabited wilderness. There is a vast central valley between the three great mountains, but it is almost unknown and untenanted.

The whole island is but the base of a collection of volcanic mountains, the successive eruptions of which appear to have formed it, rather than the effects of upheaval. Indeed the whole range of the Sandwich Islands seem but the outlets of volcanic fires and products, which, commencing at Bird Island in the N.W., have acquired their greatest force and magnitude at Hawaii in the S.E. The general direction of this, parallel to the great mountain chains of America on the one hand, and nearly that of Kamtschatka, to which quarter it is directed, seems to indicate some general law in the structure of the earth, or some fissures in the crust exist in this region of it.

There are three principal mountains in Hawaii Mauna Kea—in the N.E., Mauna Hualali in the N.W., and Mauna Loa in the South.

Mauna Kea (or Mowna Kaah) is less evidently an active volcano than the others. It was found to consist almost entirely of scoræ, without any apparent craters. It may be characterized as a vast mound, surmounted with nine cones, the southernmost of which is the highest. Perhaps these cones may be considered as craters. Although a sister mountain to Mauna Loa, it is of very different form and apparent composition. On its summit frosts prevail, and vegetation continues up to within 1,000 feet of its summit, and even higher. The plants also differ. Their height is singularly equal, not being more than 193 feet higher than the summit of Mauna Loa, or 13,953 feet, according to the measurement of Commodore Wilkes in 1841, which is 300 feet higher than previous estimates (13,645 feet).

Mauna Huahali, or *Huarari* (or *Worraray*, as it is called by Vancouver), although not of such gigantic dimensions as the other two principal mountains, is yet very conspicuous. On its summit is a very extensive crater, which has been instrumental in wonderfully changing the surface of the surrounding country. Besides the central spiracle, hundreds of cone craters, or hills of scoriaceous lava, may be seen from its summit, like excrescences on its sides. Its height is given as 7,822 feet.

Mauna Loa, or *Mowna Roa*, was from Cook's first estimate considered to be one of the highest mountains in the world. Although his calculation was in excess, it is still to be ranked with the loftiest mountains. Its form is unique, and has been increasing, and is perhaps entirely formed from the overflow of its terminal crater. Its form is that of an extensive flattened dome, falling very gradually on its northern and eastern sides. At a distance it looks as if travelling over its smooth surface would be easy, but a different idea will be formed on attempting it. Its summit was ascended, and numerous observations made here by the U.S. Exploring Expedition, in 1841. The highest part of the edge of the summit crater was then found to be 13,760 feet above the sea. The crater is a most extensive one, and possesses all those wonderful characteristics which have been so frequently described. This crater, although not now exercising such tremendous power as the surrounding country gives evidence of, is still in action.

The *Kilauea* or *Kiraueah Volcano* lies on the side, as it were, and to the S.E. of *Mauna Loa*. It is merely an immense crater, $3\frac{1}{2}$ miles long, $2\frac{1}{2}$ miles wide, and over 1,000 feet deep. The bottom in the day-time looks like a heap of smouldering ruins; what is wonderful in the day becomes ten times more so at night. The immense pool of cherry-red liquid lava, in a state of violent ebullition, illuminates the whole expanse, and flows in all directions like water, while the illuminated cloud hangs over it like a vast canopy. The height of this singular volcano above the sea was found to be 3,970 feet. To the S.E. of it is a line of craters, from some of which a great eruption occurred May 31, 1840. Having thus described briefly and imperfectly these, the most wonderful features of the Pacific, we pass on to the coast, commencing with the S.E.

KAPOHO POINT is the easternmost projection of the island. The country is exceedingly fertile; sugar-cane grows here in abundance, coffee succeeds well, as do indigo and tacca, from which arrow-root is made. The coast to the N.W. is a precipitous shore, about 15 feet high, on which the sea beats with violence at all times. It is bestrewed with lava streams, apparently of old date. At 3 miles from the East point is *Puna*, where there is a large church, but no village, as the houses are much scattered. *Kanakiki*, a small village, is $1\frac{1}{2}$ miles from *Puna*, and 3 miles farther is a spot where an extensive stream of lava enters the sea, called *Nanavalie*. Prior to the eruption the coast was a continuous lava cliff; now the site is occupied by three sand-hills, formed by the lava stream, of very singular formation, the highest 250 feet. There is no appearance of shoal water opposite, though such was stated to be the case.

HILLO, WAIKEA, or BYRON'S BAY, is the first, indeed the only place of consequence, on this side of the island to the seaman. The bay has been variously named. Lord Byron calls it *Hido* (*Hilo*, Wilkes), after the village in

the bottom of the bay. Lieutenant Malden calls it after another village, *Waiakia*; and the third is from the name of the British commander who first anchored here, but is scarcely now thus known among the natives. The following directions are by Lieutenant Malden :—

H.M.S. Blonde, as before stated, was the first man-of-war that ever entered this bay, and hence it was called after her commander. The western side runs nearly North and South, about 9 miles; the eastern, E.N.E. and W.S.W., about one-third that distance. The anchorage, in 6 or 7 fathoms, stiff muddy bottom, is protected from the N.E., to which it is apparently open, by a coral reef, half a mile in breadth, extending from the eastern point in a W.N.W. direction, two-thirds across the bay, leaving a channel three-quarters of a mile broad between it and the West shore, with 10 and 11 fathoms in it. When the wind blows strong, a heavy surf breaks upon the reef, but inside it is smooth. It is only exposed between N. to W. by N., from which quarter the wind never blows hard in summer, and but very rarely in the winter; only one northerly gale had been felt in two years. The surrounding scenery is the most beautiful in the Sandwich Islands, but the climate is wet, showers occurring daily. Watering is very readily done in the S.W. extremity of the bay.

In steering for the anchorage, with the sea-breeze, when about 3 miles from the bottom of the bay you will be outside the reef, in 25 to 30 fathoms. The West shore must then be kept close on board. The leading marks for the channel, to clear the West end of the *Blonde Reef*, are these:—Keep the huts on the West side of Waterfall Creek on with the eastern side of a remarkable green hill (an extinguished volcano), impossible to be mistaken, bearing by compass S.S.W. $\frac{1}{2}$ W., till the *Turret Rock* (about 15 feet high) bears W. by S. $\frac{1}{4}$ S., when you will be in 7 or 8 fathoms, stiff muddy bottom. The whole of the West coast is composed of cliffs, the huts standing upon the last and most southerly visible cliff. When upon the West extremity of the *Blonde Reef*, the above huts are in one with the western side of the green hill, bearing S. 29° W. by compass; and at the same time the centre of the same hill is on with the left of two very distant hummocks. These are frequently obscured by haze, or they would be the best marks. When at the North extreme of the reef a deep inlet, called *Cocoa-nut Cove*, in consequence of there being a group of these trees at the entrance, is quite open, bearing West by North. As there are no dangers in the channel, and it is more than three-quarters of a mile wide, there is quite room to beat any vessel out against the sea-breeze, and which, if it be fresh and steady, is preferable to running out at daylight with the land wind. The land wind frequently leaves you in the lurch, and you are obliged to come to in deep water, to prevent being driven upon the rocky cliffs of the West coast. Indeed, in turning out of the bay, with a good strong sea-breeze, as soon as you are to windward of the reef, she should keep beating to windward in a N.E. or N.E. by E. direction, not attempting to weather the North point of the bay (*Point Blonde*) until it can be done with certainty, at the distance of 5 or 6 miles at least; for, when at 3 or 4 miles to the North of *Cocoa-nut Cove*, there is no bottom with 50 fathoms, although within half a mile of shore. So that, should a vessel in this situation be becalmed, her state would be most dangerous, a heavy swell and current

constantly setting against the precipitous cliffs. Cocoa-nut Island is in lat. $19^{\circ} 43' 51''$ N., lon. (East of Karakukoa) $0^{\circ} 52' 50''$; variation, $8^{\circ} 51'$ E., June, 1826. Tide rises about 4 feet, high water at sunset, and low water at daylight, being influenced by the sea and land-breezes.*

Capt. Wilkes remarks:—As respects the Bay of Hilo, I cannot but view it as a safe anchorage. We were detained there about three months, and never had a gale strong enough to ride our anchors, though these were the winter months, December, January, and February. At times, however, there was a considerable swell rolling in, so as to make it uncomfortable on board ship. The weather was not so rainy as was anticipated, and some most delightful weather was experienced in February.

Provisions can be obtained, though not in abundance, and the markets are not well supplied. The prices are the same as those at Honolulu, although the demand is not so great. For wild cattle, thirty dollars were asked. Excellent water is to be had in great abundance, and with great ease, within the mouth of the Wailuku River; but it requires some care in passing in and out of the river when the surf is high. Landing on the eastern side of the bay is best, but it is feasible to land on the beach in proper boats. Wood is also to be had here, and at a much less price than at Oahu. There is another inducement which makes it a desirable place for vessels to recruit at,—there are no grog-shops as yet.

Earthquakes are common at Hilo. Wilkes records fifty shocks that were felt in eight years, from 1833 to 1841. One effect of these earthquakes is causing those enormous and destructive waves, such as are noticed on page 113. One of these occurred both here and at the Friendly Islands on November 7, 1837, nearly coincident with the earthquake in Chili on the same day. It here rose 11 feet above ordinary high-water mark; but although the devastation occasioned was very great, but few lives were lost.

Hilo itself is a straggling village, almost hidden by the sugar-cane planted around the houses. A good road has been made through it for the extent of a mile, at one end of which is the mission establishment. The whole settlement forms a pretty cluster; the paths and roadsides are planted with pine-apples, and the soil covered with a rank vegetation. *Waiakea Point* is on the opposite side of the bay from Hilo, at rather more than a mile off; the path between leads along a sandy beach, on which the surf continually breaks, and at times with great violence.

“The scene which the island presents, as viewed from the anchorage in Hilo Bay, is both novel and splendid; the shores are studded with extensive groves of cocoa-nut and bread-fruit trees, interspersed with plantations of sugar-cane; through these, numerous streams are seen hurrying to the ocean; to this succeeds a belt of some miles in width, free from woods, but clothed in verdure; beyond is a wider belt of forest, whose trees, as they rise high from the sea, change their character from the vegetation of the tropics to that of the polar regions; and, above all, tower the snow-capped summits of the mountains.”—(Wilkes, vol. iv. p. 110.)

* Lieutenant Malden's Official Account, &c.; Voyage of the *Blonde*, p. 254.

The coast to the northward of Hilo is somewhat peculiar; it is a steep bluff, rising about 200 feet; this is cut into small breaks, called here "gulches," within which the villages are generally situated, and the natives grow bananas and taro. These gulches are ravines from 800 to 1,000 feet deep, which have been apparently worn by water-courses. There is no landing for boats, for all along the coast the surf beats on the rocks with great violence.

The *N.E. coast* of Hawaii, beyond Hilo Bay, is a lee shore, without shelter or anchorage. The coast is firm and compact, terminating generally in steep rocky cliffs, with a few small indented bays, rendered easily accessible to the native canoes by the sandy beaches that bound them. From these rugged rocky cliffs many streams of water fall, in cascades or otherwise, into the ocean.

Capt. Sir Edward Belcher approached these islands from the E.S.E. July 7, 1837, and passing within 3 or 4 miles of the breaker line, witnessed these numerous cascades resulting from the showers emanating from the heavy clouds which capped the summits of Maui and Hawaii. "No description can convey the idea of the number and variety of the silver threads which they exhibited; and a sketch, including twenty leaps within 100 or 200 yards, would appear almost a burlesque, yet such was the fact."

The southern portion of this section of the land has a very dreary aspect: Vancouver says it was perfectly uncultivated, and nearly destitute of habitations; those which are to be seen are small, and thinly scattered. Advancing to the N.W., the population and cultivation increase. At about 5 leagues from *Healaka Point*, which is called by Vancouver the N.E. point, the coast is composed of a cluster of remarkably high, steep, rugged, and romantic cliffs, discharging from their naked summits many rapid cataracts into the ocean. The rushing of these impetuous torrents down the black, barren surface of the rocky cliffs, contrasted with the enchanting, cultivated, and populous country to the East and West, and behind this dreary frontier, for a considerable distance up the sides of the lofty mountains, on approaching them in the offing present a very beautiful and picturesque appearance. Nearly in the centre of these cliffs is a tolerably deep, small bay, off the *Waimanu Valley*, much resembling in appearance, and most other respects, the bay in the Island of St. Helena; but it seems too much exposed to the sea and the prevalent wind to be an eligible place for shipping. At 8 miles to the westward of this bay, off the western extremity of these cliffs, lie some rocky islets, at a little distance from the land.

Westward of these cliffs there are soundings off shore, as Vancouver found 7 fathoms at 2 miles off, the North (West) point bearing S. 70° W., 9 miles distant. The sea breaks with great violence, near the shore at this part, and so continues all the way to the N.W. point of the island. There was a very heavy, confused, irregular sea, which was suspected to arise from a very sudden decrease in its depth, and the effects of a strong gale.

UPOLU POINT is the N.W. point of Hawaii. The land here falls in a gradual descent from the base of the mountains, and forms an extensive plain towards the water side, which seemed to be in a high state of cultivation, and abounds with native houses.

The *Kohala* or *Koarra district* lies on the North point of Hawaii, and is

divided from that of Waimea by a range of mountains. The soil on the leeward shore is barren from 3 to 5 miles inland. On the windward shore it is of good quality quite to the beach. The face of the country is regular, gradually ascending from the coast to the summit of the high lands. Kohala is the principal place in the district, and the residence of an European missionary. It is estimated that there are 50,000 acres of good arable land in this district.

There are soundings off the coast to the southward of Upolu Point. Vancouver anchored here about 7 miles from the point, in 41 fathoms, but drove off the bank in the night with a gust of wind from the land. On this account it is objectionable; it is exposed to the North winds, which, with those that blow from the N.W., are the most violent and dangerous known in this country.

TOWAIHAI, KAWAIIHAE, TOEAIGH (Vancouver), or TOE-YAH-YAH (King) BAY, is 16 miles South of Upolu Point. Capt. King says this extensive bay is bounded to the North by two very conspicuous hills. Towards the bottom of the bay there is foul corally ground, the soundings are regular, with good anchorage in 20 fathoms. Capt. Wilkes says of this part:—The district of Waimea is situated on the N.W. side of the island. So much of the soil of this district as lies along the coast, though rich, is badly watered, and 7 or 8 miles in the interior from Kawaihae Bay, it becomes exceedingly rocky and barren. The high land to the eastward of Kawaihae causes almost a perpetual calm. This mountain region is rocky, and has a burnt appearance, until the eastern side of the mountain is reached, when a dense forest and a most luxuriant vegetation succeed. The climate of this district is, upon the whole, unpleasant, particularly at Waimea, in consequence of the trade-wind, which is exceedingly strong, bringing with it a mist towards sunset. This wind rushes furiously down between the mountains which bound the valley of Waimea, and becomes very dangerous to shipping in the bay. It is called by the natives "Mumuku," and is foretold by them from an illuminated streak that is seen far inland. This is believed to be caused by the reflection of the twilight on the mist that always accompanies the Mumuku.

The productions of Waimea are the same as those of the other districts, but it also abounds in timber of good size and quality for building. This was the famous sandal-wood district, whence Tamehameha (the late king) procured the cargoes he sold for the Canton market. There are no trees left now larger than mere saplings. Waimea was also the principal place of export for hides, tallow, and beef. Of these articles only a small amount is now exported, owing to the tabu on cattle.

Vancouver anchored in this bay February 14, 1793, and again on February 28, 1794, in 25 fathoms, on a bottom of fine brown sand and mud in the first visit, and on a stiff clay and good holding ground in the second, the points of the bay bearing N. 36° W. and S. 31° W.; the Morai, which is also conspicuous in pointing out the station, N. 68° E.; and the watering place at the distance of about 1½ miles, being the nearest shore, S. 79° E. The Morai is a conspicuous object, and a good leading mark into the anchorage: it stands on a barren eminence to the southward of the village, and is to be kept on a line with a small saddle hill, on the eastern land, descending from the higher parts, over the village of Toeaigh, on the North side of the bay. Its South point, descending gradually

from Hualalai, and forming a low point, bore by compass S. 31° W. : within this point, on the rising land, are some elevated hummocks ; the third of these, from the point forming a kind of saddle hill in a line with a low, projecting, black, rocky point, in the middle of the bay, bearing S. 22° W., is a further direction, and a cross mark for this anchorage. On sounding round the ship, about a fourth of a mile to the S.W., a very small patch of coral rocks was found, where the water was only 10 fathoms in depth, but increased suddenly to 20 fathoms all around it. This was afterwards found to have only 3 fathoms in one part. On the opposite side, however, was clear, good anchorage for about a mile, where many vessels might ride without inconvenience from the bottom, though nevertheless exposed to the violence of the winds and sea between the limits above mentioned, comprehending 113° in the western quarter.

The shoal is a very great inconvenience to the roadstead, which is at best but a very indifferent one, being entirely exposed to the N.W. winds and the western oceanic swell, which beats with great violence on the reefs encompassing the shores. The only advantageous circumstances are, the run of water, which, however, does not always flow, and the probability of procuring refreshments, from its contiguity to the populous and fertile western part of the Koarra district, and the plains of Waimea lying behind the land constituting the sea-coast.

The watering place is in a small sandy bay, where, over a space of 20 yards of rugged rocks and stones, a fine stream empties itself, whose water is easily to be procured by landing the casks on the sandy beach, and having the water brought in smaller vessels to fill them, a service in which the natives would be useful.

Vancouver says :—"Toeaigh (Towaihai) is situated in a grove of cocoa-nut trees, just behind a sandy point. A reef of coral rocks, extending thence about three-quarters of a mile into the sea, rendered it inaccessible to our boats in a direct line, but we landed very commodiously in a narrow channel between the reef and the shore, near the Morai, to the S.E. of the beach. The village only consisted of straggling houses ; in the centre of them was a reservoir of salt water, from which salt was made."

From the bottom of the bay the coast extends for about 28 miles in an irregular S.W. direction to the westernmost point of Hawaii, *Kaulano Point*. We have no particular description of this, which is the less important, inasmuch as it does not appear to afford any shelter or interest to the mariner.

The S.W. side of the island is termed the district of *Kona* (or *Akona*), and includes Karakakooa and Kairua or Kailau.

The district of Kailau is similar in character to that of Karakakooa, but the lava is of more recent formation, the eruptions from Mauna Hualalai having flowed down and covered nearly the whole northern portion. This eruption happened in 1809 and 1810. The mountain is 7,822 feet high, and rises abruptly on its West side.

This being the lee side of the island, as explained in a former passage, rain very seldom falls here, and this, with the absence of all dew, does not allow of much cultivation. There is coarse herbage enough for slight pasturage near the shore, but farther inland it becomes better, and the taro and bread-fruit are abundant. Land and sea-breezes are very regular, and are the prevalent winds.

KAILAU, KAIRUA, or, as it is called by Vancouver, TYAHTATOOA BAY, is in this district, 9 miles from the West point. In Meares's account of Capt. Douglas's voyage this bay is considered equal or superior to that of Karakakooa, but Vancouver's closer examination led him to a different conclusion. It is but a slight bend in the general line of coast, not more than 2 cables' length in depth, according to Capt. Duperrey's chart, and scarcely deserving the name of a bay. Vancouver anchored with the northernmost point bearing N. 69° W., by compass; the village, called Ane-oo-rooa, being the nearest shore, N. 30° E., about half a mile distant, and the point of Kowrooa (Kolui), S. 22° E. This was as close to the shore as prudence would allow them to lie, and the bottom in all directions appeared to consist of a mixture of rocks and sand. A considerable swell rolled in from westward, and by the beaten appearance of the rocks that chiefly compose the shore, this seemed to be in general the case, and for that reason not a very eligible place for shipping. It has, however, one superiority over Karakakooa in respect of landing. This convenience is produced by the jutting out of two points; between these is a small cove, defended by some rocks lying before it, which break the violence of the surf, and render communication with the shore very commodious. The landing is on a sandy beach, before a grove of cocoa-nut, bread-fruit, and other trees, in the midst of which the village is situated. On a point on the West side is the tomb of the late king Tamehameha. Toward the South part of this cove is a spring, which rose very rapidly from amongst some rocks that are generally covered with the sea water; but when this is low, which is sometimes the case, it is found to produce a stream of excellent fresh water; by proper means there is no doubt but that it might be made available for the neighbourhood and shipping. Wilkes says that this place had thriven greatly from the industry encouraged by the native governor of Hawaii.

The variation here is 10° E. according to Capt. Duperrey.

The next district, or rather portion of the district of Kona, is that of Karakakooa, or Kealakeakua, which lies to the southern end of the preceding. Wilkes describes it thus:—"Almost the whole coast of this district, extending 40 miles, is one line of lava. This frequently lies in large masses for miles in extent, and is in others partially broken, exhibiting perpendicular cliffs, against which the sea dashes with fury. This formation extends half a mile into the interior, and as the distance from the sea increases, the soil becomes richer and more productive. The face of the country, even within this rocky barrier, is rough, and covered with blocks and beds of lava, more or less decomposed. The land in places reaches the altitude of 2,000 feet, and at the distance of 2 miles from the coast begins to be well covered with woods of various kinds of trees, which are almost rendered impassable by an undergrowth of vines and ferns. In these woods there are many cleared spots, which have the appearance of having been formerly cultivated, or having been burnt by the descending streams of lava. In some places these strips of wood descend to within a mile of the shore, having escaped destruction. These are in no place parallel to the shore, but lie always in the direction which the streams of lava would take in descending from the mountains. Cultivation is carried on, and might be increased, notwithstanding the great difficulties. The

only staple commodities at present are sweet potatoes, upland taro, and yams ; the latter almost entirely raised for ships."

The climate is mild throughout the district, and there are seldom strong winds. From May to September, the wet or rainy season, there is a good deal of rain. In December, January, and February, the weather is usually very dry, and the winds prevail from the North, from which quarter it sometimes blows fresh.

KARAKAKOOA OF KEALAKEAKUA BAY has derived a sad celebrity from its being the scene of the death of the immortal Cook, the discoverer of the group, and the father of modern hydrography.

The following is Capt. King's description of it :—" It is about a mile in depth, and bounded by two low points of land at the distance of half a league, and bearing S.S.E. and N.N.W. from each other. On the North point, which is flat and barren, stands the village of Kowrowra ; and in the bottom of the bay, near a grove of tall cocoa-nut trees, there is another village of more considerable size, called Kakooa : between them runs a high rocky cliff, inaccessible from the sea-shore. On the South sides the coast, for about a mile inland, has a rugged appearance ; beyond which the country rises with a gradual ascent, and is over-spread with cultivated enclosures and groves of cocoa-nut trees, where the habitations of the natives are scattered in great numbers. The shore all round the bay is covered with a black coral rock, which makes the landing very dangerous in rough weather ; except at the village of Kakooa, where there is a fine sandy beach, with a morai, or burying place, at one extremity, and a small well of fresh water at the other. This bay appearing to Capt. Cook a proper place to refit the ships and lay in an additional supply of water and provisions, we moored on the North side, about a quarter of a mile from the shore, Kowrowra bearing N.W."

The last words of the illustrious circumnavigator's journal refer to this place :—

" At 11^h A.M. (Sunday, January 17, 1779) we anchored in the bay (which is called by the natives *Karakakooa*), in 13 fathoms water, over a sandy bottom, and about a quarter of a mile from the N.E. shore. In this situation the South point of the bay bore S. by W., and the North point, W. $\frac{1}{2}$ N. We moored with the stream anchor and cable to the northward, unbent the sails, and struck the yards and topmast. The ships continued to be much crowded with natives, and were surrounded by a multitude of canoes. I had nowhere in the course of my voyages seen so numerous a body of people assembled at one place ; for, besides those who had come off to us in canoes, all the shore of the bay was covered with spectators, and many hundreds were swimming round the ship like shoals of fish. We could not but be struck with the singularity of this scene ; and perhaps there were few on board who now lamented our having failed in our endeavours to find a northern passage homeward last summer. To this disappointment we owed our having it in our power to revisit the *Sandwich Islands*, and to enrich our voyage with a discovery which, though the last, seemed in many respects to be the most important that had been made by Europeans throughout the extent of the Pacific Ocean."* The subsequent proceedings of the discovery ships are familiar to all. Capt. Cook on his landing was received by the natives in a

* Cook's Last Voyage, vol. ii. pp. 547-8.

most extraordinary manner. He received unmistakable evidences of adoration addressed to him, and several religious ceremonies occurred, in which he was the principal object. The most unbounded liberality was also shown to the visitors, and all was friendly and respectful. The ships quitted the bay on the 4th of February, but on springing the foremast they determined to return, and reached their former anchorage on the 11th following. Their reception was the reverse of what was anticipated, and suspicion and aggression in small matters took the place of the former good feeling. This led to open outbreak, and on Sunday, February 14, 1779, Cook landed with a boat's crew in the midst of an immense and armed crowd. A chief had been unfortunately shot, and the news arriving, was the signal for open warfare, and Cook was stabbed in the back in attempting to reach the boat at the water's edge. Thus died this most remarkable man at the scene of his most important discovery. The stone on which he landed is still shown; and the stem of a tree, near to the spot where he fell, is now marked with an inscription on copper relating the fact. The top of this tree has been brought to England, and deposited at Greenwich hospital.*

The name of the bay, Karakakooa, as Cook calls it, or Kealakeakua, according to the missionary orthography, signifies "the path of the gods," and is so termed from a slide in the hill, still visible, by which the natives believed the gods used to cross the bay quickly.

The bay is not extensive, and opens between two low and barren hills, on each of which stands a town. Between them a high perpendicular bluff rises directly from the water, in which are numerous caves formerly and still sometimes used as places of burial. These caves are nearly inaccessible, and resorted to by vast flocks of birds.

The district of *Kaoo*, as it is called by Capt. Cook, occupies the southern extremity of the island. The coast, says Capt. King, presents a prospect of the most horrid and dreary kind, the whole country appearing to have undergone a total change from the effects of some dreadful convulsion. The ground is everywhere covered with cinders, and intersected in many places with black streaks, which seem to mark the course of a lava which has flown, not many ages back, from the mountain Roa to the shore. The southern promontory looks like the mere dregs of a volcano. The projecting headland is composed of broken and craggy rocks, piled irregularly on one another, and terminating in sharp points.

Notwithstanding the dismal aspect of this part of the island, it is much more populous than the verdant mountains of Puna to the N.E. Nor is this circum-

* The fate of Cook is a sad evidence of an unfortunate point in his personal character. His temper was overbearing and hasty, and for this his attached friend and companion, Capt. King, remarks, he might have been justly blamed. No other navigator ever experienced such a welcome. He was the god to them which tradition led them to expect to return, and *Lono* (O-rono) as he was called, received divine honours and unbounded liberality: unfortunately they did not meet with due consideration, and he who was considered immortal was killed. All his remains were not returned at the time, but his ribs and breast-bone, as also a sledge from the N.W. coast of America, were afterwards worshipped by those who believed in his divinity. They were preserved in a small wicker basket, covered with red feathers, and deposited in a temple dedicated to Lono, on the East side of the island. They were annually carried in procession to other parts of the island. Their fate has never been properly ascertained, but it is said that some of them were brought to England by Liho-Liho. The remainder have probably been hid since idolatry was abolished.

stance hard to be accounted for; the natives prefer such ground as lies more convenient for fishing, or is best suited to the cultivation of yams and plantains. Now, amid these ruins there are many patches of rich soil, which are carefully cultivated, and the neighbouring sea abounds with excellent fish. Off this part of the coast Capt. King could find no ground at less than a cable's length off the shore with 160 fathoms of line, excepting in a bight to the eastward of the South point, where they had regular soundings of 50 and 58 fathoms over a bottom of fine sand.

The *South point* is in lat. $18^{\circ} 54'$, lon. $155^{\circ} 39'$, and on it stands a tolerably large village. After Cook's visit it was reported that good anchorage and excellent shelter existed close round on the western side of this South point, and had been overlooked by that navigator; but Vancouver, to set the matter at rest, examined it, and found that the shores were nearly straight, and exposed to a most tremendous surf, that broke with such fury as to render landing, if not impossible, highly dangerous, even to those inhabitants who are most expert in the management of their canoes.

The whole of the S.E. side between the South point and Kapoho Point, a distance of 65 miles, affords not the smallest shelter or anchorage of any description.

MAUI, or Mowee of the older navigators, is the next large island to the N.W. At a distance it appears like two islands, but a nearer approach shows the low isthmus only a few feet above the sea, and is 9 miles across, uniting the two peninsulas. The whole island, like all the rest of the group, is volcanic, and appears to have been produced by the two adjacent volcanoes, which have ejected the enormous masses of matter of which it is composed. The island resembles Tahiti more than Hawaii does, both in form and appearance. The lofty summits of the southern peninsula are never covered with snow, though they are often seen above the islands. The high land is steep and rugged, showing at all times the igneous nature of its formation, extinct craters and indurated lava streams; where this has decomposed, the sides of the mountains are covered with shrubs and trees.

The surface of the northern peninsula does not appear to be of such recent formation as that of the northern, and although it is of evident volcanic formation, the marks of recent eruption are seldom seen.

East Maui is the largest peninsula, and rises in one unbroken mountain 10,000 feet high, which falls almost perpendicularly towards the sea. West Maui has many sharp peaks and ridges, divided by deep valleys, which form sloping plains of considerable extent on the North and South sides. Its highest peak is 6,130 feet high.

The South point of Maui, *Cape Kahiki*, is formed by rugged, craggy rocks, and the sea breaks at a little distance to the N.W. of it; the edge of this bank is very steep-to, suddenly shoaling from no bottom with 80 fathoms to 25, and then to 10 fathoms. The South side of the island terminates very abruptly in the ocean, and, though rugged, is verdant and fertile.

The North coast of East Maui is a succession of deep ravines, running up the mountains; and down them cascades, several hundred feet in height, but with little

volume of water, are to be seen falling. In this respect it resembles the windward side of Hawaii. This circumstance renders travelling along the coast impossible. The central mountain is named *Mauna Haleakala* ("house of the sun"), and somewhat resembles Mauna Kea, on Hawaii. The crater on its summit has not been in action within memory. Its edge was ascertained by the United States' Expedition to be 10,200 feet high. The limit line of woods was found to be at 6,500 feet.

The isthmus is, as before stated, very low, and consists of sand constantly shifting, and thrown up into "dunes." It is too dry for cultivation, and is about 20 by 15 miles in extent. For nine months of the year it is a fine grazing country, and feeds large herds of cattle.

The East end of West Maui is an abrupt precipice, several hundred feet high on the coast. On the S.E. part of it is a female seminary, of some celebrity, called *Wailuku*. It is an extensive range of coral and adobe buildings in a flourishing village, and is one of the best organized establishments in the Sandwich Islands. We have no nautical particulars of the northern portions of Maui, and therefore pass on to the capital of the Sandwich Islands.

LAHAINA lies on the S.W. side of West Maui. It has been, for a considerable time, the residence of the king. After Tamehameha had conquered the group in 1795, the year after Vancouver's visit, he removed the seat of government to Honolulu, Oahu; but his successors found this too troublesome a site from the importunities and assumptions of the white residents and white visitors. Lahaina was therefore selected as the most central position of the archipelago. The first missionaries were planted here in May, 1823.

The town of Lahaina is built along the beach for a distance of three-quarters of a mile; it is principally composed of grass houses, situated as near the beach as possible; it has one principal street, with a few others running at right angles. After the king's palace, the fort is the most prominent object; its form is quadrangular, the longest side facing the sea; it is of little account, however, as a defence, serving chiefly to confine unruly subjects and sailors in. The area within is about an acre, and the walls are 20 feet high. According to the observations of the United States' Exploring Expedition, it is in lat. $20^{\circ} 51' 50''$, lon. $156^{\circ} 41' 0''$. The tide here is irregular, being somewhat dependent on the winds; it runs to the N.W. generally, sixteen hours out of the twenty-four.

The seminary of Lahainaluna is the most remarkable building to be seen as the bay is approached. It stands on the side of the mountain behind the town, and 2 miles from it. It was founded in 1831, for instructing school-teachers, but its system has since then been changed, and it is not so effective. An excellent chart of the Sandwich Islands was engraved at this establishment, a singular production for this remote spot.

Lahaina is in some points a preferable place to Honolulu for refreshment; more order reigns here than in most places in the Pacific; and the absence of foreigners and their attendant grog-shops causes less temptation to be thrown in the way of crews ashore. Provisions, especially potatoes, are abundant, and for these reasons it is a great resort of the American whalers. The town contains about 3,000 inhabitants.

Notwithstanding that the anchorage on this side of Maui is well sheltered, Vancouver considered that the bottom was only a slight covering of sand over a bed of hard coral. The lead does not discover this, but, on anchoring, the deceitfulness of the bottom is manifest. The roadstead of Lahaina is only an open one; the shores are bounded by a reef, with only one landing for boats. The soundings decrease regularly to 5 fathoms close to the reef, extending in general about one-fourth of a mile from the beach. The West extremity of Maui forms, with the West point of the roadstead bearing N. 14° W. and S. 14° E., a league asunder, an excellent little bay. The North point is formed by a round hill close to the water side.

The southern side of West Maui has a forbidding aspect; the shores, however, are not so steep and rocky as elsewhere, and have generally a sandy beach. There is a roadstead here called by Vancouver *Patoa*, which is represented as good anchorage, and may be easily found by attending to the following description:—The large bay, formed by the two peninsulas and the sandy isthmus, has its western side formed by high rocky precipices, that rise perpendicularly from the sea. To the westward of these precipices the coast is chiefly composed of sandy beaches, and the mountains, at some distance from the shore, form two remarkable valleys, separated from each other by a high rugged mountain, seemingly detached from the rest, and approaching nearer to the beach than those to the right and left of it. The anchorage at *Patoa* is abreast of the easternmost of these valleys, which appeared fruitful and well cultivated.

The western side of this large bay (*Kamalaëa Bay*) is formed by rocky cliffs and precipices; its opposite shore is about 4 miles distant; the soundings on the eastern side are regular, but very rocky. Nearly in the middle of its western side is a village (called Mackerrey by Vancouver), off which there is anchorage in 7 fathoms water, a little more than a quarter of a mile off shore, bottom of sand and broken coral. It is only open to about two points to the S.W., but there is not much wind from that quarter; one great inconvenience attending the anchoring in any part of this bay is the violent squalls which blow over the isthmus. These gusts, or rather gales of wind, blow constantly when the trade-wind blows fresh at sea, and especially when it is most from the northern quarter. At these times it prevents any communication with the shore, and this is the more serious, as the holding ground is treacherous.

Another anchoring place will be found near the S.W. point of East Maui, a little to the southward of a remarkable round hill on a sandy beach, projecting its rocky base into the sea. From the appearance of its summit it was called Volcano Hill, and lies N. 26° W. about a league from the South point of Maui, and directly opposite the Island of Molokini. The soundings are regular, from 7 to 15 and 25 fathoms. The beach appears convenient for landing on, but there is no water.

MŌLOKINI (or *Morokini*), or *Morrotinee*, is a barren rock which lies between Tahaurawe and Maui. It is high, or it would be dangerous to shipping. It is only visited by fishermen, who dry their nets on its barren surface. It lies in the strait separating Kahoolawe from East Maui.

KAHOOLAWE (*Tahaurawe*, *Tahoorowa*, or *Kadoolawe*) lies off the S.W.

point of Maui, and from its shape and appearance seems as if it once formed a part of that island, and been detached by some convulsion. It is low, and almost destitute of every kind of verdure or shrub, excepting a species of coarse grass. There are no evidences of active volcanic agency.

It is 14 miles long and 5 miles wide. It is only inhabited by a few poor fishermen, and is used as a place of exile. The whole South part is covered with a light soil, consisting of decomposed lava, and destitute of vegetation. On the North side there is a better soil, capable in some places of vegetation. A cluster of huts near the water is the residence of the convicts, and there are one or two houses on the North end. Off the West point of the island, *Cape Kealaikahiki*, is a detached shoal, seen by Cook in his discovery of the island, February 24, 1779. It lies $1\frac{1}{2}$ miles off the point, and has 9 feet water on it. Vessels may pass safely within 2 miles of the point, but it will be much better not to approach within 3 miles. This shoal is remarkable as the only one hidden from the navigator around the Sandwich Islands.

LANAI or RANAI lies to the West of West Maui, 20 miles to the N.W. of Kahoolawe; the space between is called the *Auau Channel*. Lanai is a dome-shaped island. It is higher than Kahoolawe, but is neither so high nor broken as any of the other islands. The greater portion of it is barren, and the island in general suffers from the long droughts which frequently prevail; the ravines and glens, notwithstanding, are filled with thickets of small trees, which serve useful building purposes to the natives of Maui. The island, like the rest of the group, is volcanic; the soil is hollow, and by no means fertile; the shores abound with shell-fish, medusæ, and cuttle-fish. The inhabitants are not numerous. It is about 15 miles long and 6 miles broad. The country to the South is high and craggy; it appears to have been frequently rent, large fissures being apparent on its sides. The other parts of the island have a better aspect.

MOLOKAI or MONOROI lies to the N.W. of the preceding, and is of a different figure. It is a long, irregular island, apparently formed by a chain of volcanic mountains, 40 miles in length, and not more than 7 to 9 miles broad. The mountains are nearly equal in elevation to those of Maui, and are broken by numerous deep ravines and water-courses, the sides of which are frequently clothed with verdure, and ornamented with shrubs and trees. There is but little level land in Molokai, and consequently but few plantations; several spots, however, are fertile, and repay the toils of their cultivators.

One-third of the island to the West is a barren waste, and has but few inhabitants. The remainder, to the East, is almost one entire mountain, rising gradually from the South to the height of 2,500 feet; while to the North it is almost perpendicular. On the South side there is a narrow strip of land, not exceeding one-fourth of a mile wide, the soil of which is very rich, and which contains the greater part of the population. The soil here, however, is too dry for cultivation, which is carried on in the uplands. The people are very poor, and ill-provided with necessaries: in 1832 their number was 6,000; in 1840 only 5,000; at the former period it was first occupied as a missionary station. There are several small harbours within the reef on the South side, at *Kaluaaha*, the missionary station, which are capable of sheltering vessels of from 60 to 80 tons.

The East point of the island is called *Hulawa Point*; and half a league South of it is a small, barren, rocky islet, called *Modoonete*; and from this point the shores of the island lie S. 53° W. Off the N.W. end of the island a small bay was observed by Cook; but it was found by Vancouver that the space indicated was nearly a straight shore, composed alternately of rugged rocks and sandy beaches. He anchored in 19 fathoms, within about a mile of the breakers, on a fine sandy bottom; the West point of the island bore South by compass, distant 4 miles, and the N.W. point, N. 26° E. about the same distance. This was as close as safety would allow, but it is entirely exposed to the North and N.W. winds, which frequently blow with great violence, and to the very heavy roll of the sea.

OAHU, or *Woahoo*, the next island in succession, may be looked on in one sense as the principal of the group, as regards maritime affairs, inasmuch as it contains the port chiefly frequented by the shipping of the North Pacific. The island is 40 miles long by about 20 miles broad. Like the rest of the islands it is of volcanic formation; Capt. Cook only saw the North or *windward* side, and, judging from this alone, it appeared to him to be by far the finest island of the group. Nothing could exceed the verdure of the hills, the variety of wood and lawn, and rich cultivated valleys, which the whole face of the country displayed. A different conclusion was arrived at by Capt. Wilkes, who came first upon the *lee* side. The appearance of Oahu is by no means inviting; it has a greater resemblance to the desert coast of Peru than any other of the Polynesian islands we had visited, and has as little appearance of cultivation. The country, at first sight, would be termed barren and rocky. There could not be a better example of perfectly opposite characters applied to the same place than this, nor a better evidence of the great variation in climate which may occur within a very short distance. But whatever may be said of the unpromising appearance of its southern side, there is no doubt but that it is the garden of the Sandwich Islands.

The East end of the island is called *Cape Makapua*. There are numerous caves here, situated in a bluff of 300 feet elevation, and the mouths of them are at about two-thirds the height. They have been, and are still sometimes, used as burial-places. They are the effect of volcanic action. At 12 miles from this point is the Peninsula of *Mokapu*, which forms the Harbour of *Waialai*. The entrance of this has only 9 feet water, a depth only fitting for the island vessels. Opposite to it inland is *Kaneote*, the mission station for the North side of the island, in the district of Pali Koolau. This district contains about 4,500 inhabitants, and the productions are similar to the island generally. Sugar and coffee are beginning to be raised. There is a belt of arable land extending along this district, which increases in breadth to the westward. This narrow strip of land, varying from half a mile to 2 miles in width towards the North end, is called the Koolaulo district. It is bounded by the mountain chain of Konohaunui. This belt is only a few feet above the sea. From its position on the island it receives abundance of rain for agricultural purposes. There are several small streams, which will drive the machinery for sugar-mills. The scenery of this part is most enchanting for beauty, boldness, and variety; stupendous precipices, rising some 2,000 or 3,000 feet, with numerous small streams gushing down their sides.

The district of Waialua stretches from the most westerly cape of Oahu, called Kaena, to Waimea, in the district of Koolaulo, on the N.E., and to Waianae, on the S.W., a distance along the coast of above 20 miles. Within this district are a few bays for vessels not exceeding 150 tons burthen; the best of these is Rawailoa. Those to the N.E. are Waimea, Haula, Kakaua, Moluilui, and Makua. Part of this district produces abundantly, being cultivated by irrigation. Five considerable streams water it from the Konahaunui range, passing down the fertile valleys. The *Bay of Waimea*, or *Whymea* as King calls it, was visited by the *Resolution* and *Discovery* in February, 1779; they anchored in 13 fathoms, sandy bottom, the extreme points of the bay bearing S.W. by W. $\frac{1}{4}$ W. and N.E. by E. $\frac{3}{4}$ E., off the mouth of a fine river, running through a deep valley: watering here, however, could not be well effected on account of a reef of coral, which stretches along shore to the distance of half a mile.

At *Rawailoa* the coast forms a small bay, and has a dreary aspect on first landing. The soil is sandy and poor, and the people have a squalid and miserable appearance, but at a short distance inland a great and pleasing change is seen. It was near here that Mr. Gooch, the astronomer to Vancouver's expedition, and Lieutenant Hergest, were killed by the natives.

From *Kaena Point*, which is the western cape of Oahu and the southern limit of Waimea Bay, the western coast of Oahu trends S. 25° E. 20 miles, to the S.W. point, or *Waimanolo Point*. It is composed principally of steep, craggy mountains; some descending abruptly into the sea, others terminating at a small distance from it, whence a low border of land extends to the sea-shore, formed by sandy beaches, chiefly bounded by rocks, over which the surf beats with great violence. Vancouver says, nearly in the middle of this side of the island is the only village we had seen westward of Opooroah (the Pearl Lagoon). In its neighbourhood the bases of the mountains retire farther from the shore, and a narrow fertile valley winds through the hills. The shore here forms a small sandy bay. On its South side, between two high rocky precipices, in a grove of cocoa-nut and other trees, stands the village; and in the centre of the bay, about a mile to the North of the village, is a high rock, remarkable for its projecting from a sandy beach. At a distance it appears to be detached from the land. Between this and the high rocky point to the South of the village is a small bank of soundings, stretching some distance into the sea. The South side of this bank has irregular rocky soundings, from 25 to 8 fathoms; to the North of it the edge is very abrupt.

The district of *Ewa* occupies the S.W. portion of the island, extending eastward to within 7 miles of Honolulu, and 20 miles along the sea-shore. Unlike others on this side the island, it is well watered by copious and excellent springs, the streams from which are sufficient for working sugar-mills. This is the best part of Oahu for raising cattle and sheep, which are seen here in greater numbers than elsewhere. The *Pearl Lock*, or *Pearl River Harbour*, lies on the South side of the island; the entrance being about 8 miles East of the S.W. point. It is an extensive inlet of the sea, into which the River *Ewa* empties itself. It derives its name from the fact of the pearl-oyster being found in it. It is not met with elsewhere in the Sandwich Islands. The inlet has somewhat the appearance of a

lagoon that has been partially filled up by alluvial deposits. It affords abundance of excellent fish. The depth of water in the mouth is only 15 feet; but after passing this coral bar, which is 400 feet wide, the depth of water becomes ample for large ships, and the basin is sufficiently extensive to accommodate any number. If the bar were partially removed, which might be effected, it would afford the best and most capacious harbour in the Pacific. At present, there is little necessity for this, as the neighbouring port of Honolulu is ample for all the present requirements.

HONOLULU.—This is the principal port of the Sandwich Islands, and indeed of this part of the Pacific Ocean. It is not very many years since it was first frequented by Europeans, but Vancouver passed it without much notice, in March, 1793, such is its apparent insignificance from the entrance. He was afterwards informed by Mr. Brown, of the ship *Butterworth*, of its excellence. His tender, the *Jackall*, first entered it in 1794. Mr. Brown gave it the name of *Fair Haven*. Vancouver calls it *Honoonoono*.

Since the periods above named it has made a wonderful change in circumstances, and few places in the world now have such a variety of population and manners as is to be seen here. Sir George Simpson describes the town thus :—

“Honolulu contains a population of about 9,000 souls, nearly 1,000 perhaps being equal proportions of foreigners and half breeds. It is about half a mile long, and about a quarter of a mile broad; and it consists of one good street, which, having been but recently opened, is only half finished, with a number of narrow and irregular alleys. Most of the houses are built in the native fashion, but there are also many substantial wooden edifices, some of them of two stories, of wood, adobes, coral, and stone, with tinned roofs, which, generally speaking, are finished with balconies, verandahs, and *jalousies*, and enclosed within small gardens of exotic and indigenous ornamental plants.

“But already has this incipient metropolis begun, like its older models, to go out of town. The more respectable of the foreign residents have their rural boxes up the adjacent valleys, but more particularly that of Nuuanu or Great Cold, as being the nearest and most accessible.”

Capt. Wilkes says :—“The aspect of the country around Honolulu, as seen from the roads, is barren; the plain on which the town stands is destitute of verdure, and exhibits only a few scattered houses. This plain extends both East and West from the town, while behind it the land rises gradually towards the Nuuanu valley. Several crater-shaped hills are in sight, one of which, called by the foreign residents the ‘Punch Bowl,’ stands out in bold relief on one side of the valley.”

The valley of Nuuanu is formed by a break in the central volcanic ridges of Oahu; it ascends gradually from behind the town, and is about 7 miles long by half a mile wide at its entrance. It contracts until it reaches the northern side of the ridge, when it suddenly terminates in a deep precipice of 1,100 feet, called the Pali. Here the trade-wind rushes violently through between two high peaks above 1,500 feet in height, while their tops condense the clouds, whose waters are descending constantly in small silver rills, that leap from rock to rock on all sides, unite in the middle of the valley, and form a large brook, which is again distributed by the natives to give fertility and luxuriance to the vale below.

One of the most conspicuous points on the South side of Oahu is the *Leale* or *Diamond Hill*; it lies about $4\frac{1}{2}$ miles to the East of Honolulu, and forms a very picturesque object from the harbour. It is an extinct volcanic crater, the largest coast crater on the island, and has its latter name from the circumstance of bright crystals being found on its sides resembling the diamond.

The mouth of the harbour is formed by an inlet through a coral reef, possibly kept open by the fresh-water stream flowing through the town; this has been supposed to be filling up the harbour and its entrance with alluvial deposit, as a considerable diminution in the depth is observed since the earlier explorations. This is more probably owing to an entire upheaving of the coast, as is evidenced elsewhere in the diminution of water on rocky shelves off the coast and the marks on the coast itself. It is true that this might be remedied without great trouble, by deepening the channel or by doing the same to the more extensive harbour of the pearl lagoons to the westward. But this is at present premature to speculate on; it suffices now for all shipping purposes. The following directions for the outer anchorage are by Mr. H. Thompson, master of *H.M.S. Talbot*, in January, 1845:—"Just without the reef, and at a short distance to the eastward of the entrance to the harbour, there is a space of ground which affords a fair anchorage in from 12 to 30 fathoms water, during the period that the N.E. winds blow steadily, viz., March to October, the remaining months being more subject to irregular winds. Those most feared are from the southward, which frequently during the irregular season blow very strong, and at the same time send in a heavy swell; therefore vessels lying there should put to sea immediately on the appearance of wind from that quarter.

"The holding ground is indifferent, consisting of hard sand and coral, and the surface very uneven. The marks for the best anchorage are as follows, viz.: the flagstaff of Fort Honolulu, N. by E.; the outer buoy of the harbour, which is simply a pole made to float perpendicularly, and has a red vane at the top, from N.W. by N. to N.N.W.; and the summit of a round topped hill just visible over the inner part of the neck of land which connects Diamond Hill with the other part of the island, bearing about E. by N.; this hill is the only one visible in that direction. A buoy has been recently laid down to point out this anchorage with the above marks nearly."—(*Nautical Magazine*, July, 1848, p. 339.)

The next directions for the harbour are by Capt. F. W. Beechey, who surveyed it in the year 1827:—

"The *Harbour of Honolulu* has a bar, with only 20 feet water upon it at low water, and the channel is so narrow and intricate that no stranger should attempt it. The natives understand the signal for a pilot, and will come off if the weather is not too boisterous. In consequence of this difficulty ships anchor outside in about 16 fathoms water; the Punch Bowl bearing N.N.E. $\frac{1}{2}$ E., and the highest part of Diamond Point, E. by S. $\frac{1}{4}$ S.

"Should it be necessary to enter the harbour, the morning is the best time, as there are then leading winds through the passage; but after the trade-wind has set in it cannot be entered. It is necessary to adopt the precaution of having boats ready to tow or run out lines to the reefs.

"From the outer anchorage run along shore in nothing less than 11 fathoms, and

look out for a large grass hut, which stands conspicuous upon the wharf at the North head of the harbour, on the western side of a new yellow European house. When the North end of this hut is *in one* with the eastern chimney of an European built house,* with a ship's figure-head attached to it,† haul directly in for the opening between the breakers which will now be seen.

"The bar is about 50 fathoms in breadth, and consists of smooth coral rock, having 10 fathoms close to its outer edge, and 7 fathoms on the inner.

"When on the bar, the king's residence (an European built house, with a slate-coloured pointed roof), situated to the N.E. of the town, will be open to the westward of the N.W. hummock of Punch Bowl Hill; the before-mentioned mark of the hut and chimney will also be on, and is kept so until the outer cocoa-nut tree in Wytiete Bay comes in one with a small rise on the northern part of Diamond Hill. Then bring the eastern tangent of the cluster of cocoa-nut trees nearest the fort in one with a remarkable saddle on the mountain at the back of the town, until the outer part of the dry ground on the right comes on with *Diamond Point*, or until a large hut standing by itself on the North shore of the harbour is in one with *four* cocoa-nut trees in a cluster. With these marks, steer for the *four* trees; open the trees until they are a sail's breadth apart; and when the fort flagstaff is in one with the trees eastward of the fort, anchor in $4\frac{1}{2}$ fathoms, mud.

"These directions will, I think, be intelligible to a person on the spot; but I must repeat, that no stranger should run for this harbour, except in cases of absolute necessity. Should it be attempted, a good look-out from the jib-boom end, or fore-yard, will be found serviceable.

"In consequence of the sea that rolls over the reef, and breaks in 4 or 5 fathoms water, it is necessary that boats should follow nearly the directions that have been given for vessels, except that when the eastern point of the dry land, on the right of the entrance, comes in with Diamond Hill, they may then steer for the South end of a stone wall, which will be seen on the western side of the harbour; and when the before-mentioned yellow house opens, they may steer for the landing place. Unless they adopt these precautions they will, in all probability, run upon the reefs, or be upset. In entering the harbour it is necessary for the boats, as well as shipping, to keep the marks strictly on.

"I shall conclude these remarks, the greater part of which have been furnished by Mr. Elson, the master, by observing, that the water in the wells in the town is unwholesome upon a voyage, and that it is proper to send the casks up the river to be filled."—(Voyage of the *Blossom*, part ii., Appendix, pp. 655-6.)

The ensuing observations are by Mr. Thompson, R.N., 1845 :—

"There are at present two pilots for this port, natives of the United States; they reside at Honolulu, are exceedingly watchful, and generally get off to ships in the offing in good time. They are men who formerly commanded merchant ships, and in my opinion perfectly up to their business, both as pilots and seamen.

"Ships may supply themselves with abundance of good water, free of charge, from the river, by attending to the tides. It may also be procured from the pumps in the town at the rate of three cents for thirty gallons.

* The only house that had a chimney in 1827.

† These, in one, bear N. 20° E., by compass.

"Wood is sold at about nine dollars the stack, which is equivalent to about a cord and a half English.

"The market is situated on the beach near the landing place, where supplies of every description may be obtained in great abundance, at very moderate prices. The following is a list of the prices of the articles therein enumerated, as sold at Honolulu (1845):—Beef, very good, from six to eight cents per lb.; mutton, fair, from ten to twelve cents per lb.; pork, the pigs are generally sold alive, at from four to five cents per lb.; turkeys, large, one dollar each, small, half a dollar each; ducks, six dollars a dozen; fowls, three dollars a dozen; eggs, a quarter of a dollar a dozen; Irish potatoes, three dollars a barrel, very good; milk from twenty to thirty bottles for a dollar; fruits of many kinds very moderate.

"Vessels requiring repairs may have them well done by Messrs. Robinson and Co., shipwrights, who have an excellent wharf, where every facility will be found for clearing out, heaving down, &c.

"The only import duty at the port of Honolulu is five per cent., *ad valorem*, on all description of goods; but an alteration is about to be made relative to wine and spirits. It is expected that the duty on wine will be about seven per cent., and that on spirits will almost amount to a prohibition.

"There is no export duty on any of the productions of the island.

"There being no appraisers or custom-house guards, everything is left to the honour of the importer, who is required to declare on oath the value and quantity of goods on which duty is to be charged.

"All ships which come to the port of Honolulu for the purpose of trade are required to pay twenty cents per ton; two dollars for the use of the buoys; one dollar for certificate of clearance; and one dollar per foot for piloting the vessel in or out; but those vessels which call here solely for the purpose of obtaining refreshments, or for repairs, are required to pay only six cents per ton, and the other charges as above."

The only place remaining to be noticed as an anchorage is *Waikiki*, which is 8 or 10 miles to the eastward of Honolulu. Between these two places there is a vast collection of salt pits, the produce of which is exported to all the countries bordering on the North Pacific. There is anchorage off the village. Whyteete Bay, as Vancouver calls it, is formed by the land falling a little back round the S.E. point of Oahu, and although open above half the compass in the southern quarters, was considered by him to be the best anchoring place in the island, but he did not know of Honolulu.

KAUAI or ATOOI ISLAND is called *Atooi* in Cook's voyage, *Atowai* in Vancouver's, and *Atoui* by a third. The name is a compound of two words—a *Tauai*, literally, and *Tauai*. The meaning of the word *tauai* is, to light upon, or to dry in the sun; and the name, according to the late king, was derived from the long droughts which sometimes prevailed, or the large pieces of timber occasionally washed on its shores (Ellis). This island is interesting as being the first land of the group visited by Cook on their discovery. "On Sunday, January 18, 1778, at daybreak, an island (Oahu) made its appearance, and soon after we saw more land bearing North, and entirely detached from the former."

On the 19th he anchored in Waimea Bay, on the South side of Kauai, and was received by the astonished natives with profound humility and reverence, a circumstance which has since been accounted for as stated in our introductory observations.

The island is 28 miles long, and about 20 miles broad. Like the rest of the archipelago, it is of volcanic formation. On the N.E. and N.W. sides it is broken and rugged, but to the South it is more even; the hills here rise with a gradual slope, and at some distance from the shore are covered with wood. This is one of the best cultivated of the islands, and even when first discovered the plantations of the natives were managed with industry and neatness. The highest point of the island is called *Wailoli*, and was estimated by Capt. Wilkes at 6,000 feet; it is said that there is a crater on its summit, and that the natives ascend it to gain a view of Oahu, 100 miles distant.

Vancouver describes the eastern end of the island thus:—The two extremities lie N. 14° E. and S. 14° W. 9 miles from each other, and are formed by low land. The former is a rounding point, projecting into the ocean from a very remarkable forked hill, that is, in a great measure, detached from the rest of the connected mountains of the island. The latter extends from a range of low hills that stretch along the coast at a small distance from the beach. The country inland here is most enchanting and rich. About a league to the South of the southern extremity lies the S.E., or *Koloa Point*, of the island, formed by a bold, bluff, barren, high, rocky headland, falling perpendicularly into the sea. Between this and the low point is a small cove (*Puna Cove*) accessible to boats only. This portion appears to be well watered. A heavy sea rolls in on this part of the coast. There are some silk (mulberry) and sugar plantations belonging to Europeans.

WAIMEA BAY, on the South side, is the best anchoring place on the island, except in the months of January and February, when the trade-winds are interrupted, and the wind blows strongly from the S.W., directly on shore. At about a mile West of Waimea is the spot where Cook's boat first landed on the discovery of the Sandwich Islands. Cook says:—The road, or anchoring place, which we occupied, is on the S.W. side of the island, about 6 miles from the West end, before a village, which has the name of Wymoa. As far as we sounded, we found that the bank has a fine gray sand at the bottom, and is free from rocks, except a little to the eastward of the village, where there spits out a shoal, on which are some rocks and breakers, but they are not far from the shore. This road would be entirely sheltered from the trade-wind if the height of the land over which it blows did not alter its direction, and make it follow that of the coast; so that it blows at N.E. on one side of the island, and at E.S.E. or S.E. on the other, falling obliquely on the shore. Thus the road, though situated on the lee side of the island, is a little exposed to the trade-wind; but notwithstanding this defect, it is far from being a bad station, and much superior to those which necessity obliges ships daily to use in regions where the winds are more variable and more boisterous. Capt. King adds that in running down to the road from the S.E. point of the island he saw the appearance of shoal water in several places at a considerable distance from the land; and when he was about 2 miles to the eastward of the anchoring place, and 2 or 3 miles from the shore, he got

into $4\frac{1}{2}$ fathoms water, although the soundings had been usually 7 or 8 fathoms. The whole distance between Koloa and Waimea consists of a series of sunburnt hills and barren plains, sloping gradually to the shore from the mountains, and now and then intersected by ravines or gulches. The village takes its name from a river which, after a course of about 15 miles, falls into the sea at the place. Boats may ascend it for about three-quarters of a mile, and this is the only water that is not brackish. At the village is a stone fort, erected by a Russian trader from the North, but he was expelled by the authorities.

The coast to the westward of Waimea consists of a sandy plain, from one-fourth to a mile wide, and 150 feet above the sea, whence it rises gradually to the mountains. It has a sunburnt appearance, and is destitute of trees. On the low grounds the cocoa-nut tree thrives, and the sea-coast is considered the best ground for fishing, and the manufacture of salt might be extensively carried on.

Point Mana is the West point of the island; it is in lat. $22^{\circ} 4'$; and off it a reef of rocks extends about half a mile from shore. Near this the country assumes a very different aspect; from hence to Hanalai Bay the coast has a very rugged and romantic appearance, rising suddenly to lofty abrupt cliffs, that jut out into a variety of steep, rugged, rocky points, apparently destitute both of soil and verdure, but terminating nearly in uniform summits, on which, as in the valleys, are patches of lively green, producing a singular effect.

HANALAE BAY lies on the North side of the island; Capt. Wilkes calls it *Halelea*, signifying the land or place of rainbows, a name arising from the frequent rains, which clothe the country in perpetual green.

Hanalae, besides bullocks (noble animals, and meat as fine as in England), and vegetables of the finest quality, furnishes fruits, poultry, turkeys, &c., cheap and in abundance. Water can be filled in the boats, by sending them into the river.—(Belcher, vol. i. p. 61.)

In August the anchorage is safe, but when the N.W. gales blow, a very heavy sea must tumble into the bay. Capt. Sir E. Belcher was informed that a Russian store-ship rode out the season in spite of everything. The anchorage is pretty well covered by a spit, over which there are about 9 feet; but there is not sufficient space in bad weather for more than three vessels, although in the fine season the bay is spacious.

The landing is within the mouth of a small river, which carries, for a considerable distance up, from one to three-quarters of a fathom, into fresh water, and is further navigable for boats or canoes (drawing 3 feet) several miles.

The scenery is beautiful, and it is surprising that such a favourable spot should so long have been overlooked. The consul possesses a tract of land, on which his tenant (Kellett, an Englishman) feeds cattle, makes butter and cheese, and farms to great advantage. I am certain that our men derived more nourishment from the cattle we embarked there than from any previous diet, and, contrary to the general feeling, preferred it to salt, regretting its loss. I would therefore strongly advise ships of war to sacrifice much to secure these advantages.—(Sir Edward Belcher.)

NIIHAU or ONEHOW lies 16 miles S.W. of Kauai, the channel between being called the *Kaulaka Passage*. The island is about 18 miles long, and 8 miles

broad. The eastern side is rocky and unfit for cultivation, nor is there any anchorage on it.

Niihau is famous for its yams, fruit, and mats. It is the property of the king, and it is necessary, previous to proceeding thither, to make a bargain with the authorities at Oahu, who in that case send an agent to see the agreement strictly fulfilled.*

The natives are very indolent, and are a darker race than those on Oahu, and reminded Capt. Beechey strongly of those on Bow Island. They live almost entirely on the western shore, and are very poor. It is comparatively low, and with the exception of fruit trees, which are carefully cultivated, it is destitute of wood. The soil is too dry to produce taro, but on that account it is well adapted to the growth of yams, &c., which are very excellent, and of an enormous size. There is but one place in this bay, the same in which Vancouver anchored, on the western side, where the boat of a man-of-war can effect a landing with safety when the sea sets into the bay, which is of very common occurrence; this is on its northern shore, behind a small reef of rocks that lie a little way off the beach; and even here it is necessary to guard against sunken rocks; off the western point these breakers extend $1\frac{1}{2}$ miles. The soundings in the bay are regular, upon a sandy bottom, and with the wind from the eastward good anchorage, if required, will be found; but it would not be advisable to bring up under any other circumstance.

LEHUA or *Oreehoua Island*, off the North end of Niihau, is a rugged, naked, barren rock, to all appearance destitute of soil, and without any signs of habitableness. It is of very small extent, and is separated from the larger island by a channel about a mile in breadth, in which the depth appeared to be very irregular, and is therefore impracticable.

KAULA or TAHOORA lies 4 or 5 leagues from the S.E. end of Niihau, in a S. 69° W. direction. It is a small, elevated island, only inhabited by flocks of birds. This is the last of the group to the westward of which anything positive is known, but Cook heard of a small, low, uninhabited island called *Tammatapappa*, *Modoo-papappa*, *Komodoopappa* (i.e., flat island), about five hours' sail from Tahoora. It was said to be visited for the purpose of catching turtle and sea-fowl, but it has never been seen.

BIRD ISLAND is also considered as a member of the Hawaiian archipelago. It lies 39 leagues N. 51° W. from Niihau; was discovered, April 13, 1789, by Capt. Douglas, of the *Iphigenia*, who gave the name to it. It had not been previously known to the inhabitants of the Sandwich Islands, who called it *Modu-manu*, which also means Bird Island. It is merely a barren rock, of volcanic origin, about 200 feet above the water; it is bold all round, and is the resort of numerous flocks of sea-birds. Vancouver places it in lat. $23^{\circ} 6'$, lon. $161^{\circ} 57'$.

NECKER ISLE was discovered by La Pérouse, November 1, 1786. It is very small, and is only a rock of 500 yards in length, and at most 360 feet in height. There was not a single tree seen on it, but vegetation was abundant towards its summit. The bare rock was covered with birds' dung, and appeared white, contrasting with the different red spots on which the

* Beechey, vol. I. p. 234.

grass had not grown. Its shores are as steep-to as a wall, and the sea with fury broke against it everywhere; off its S.E. point only are a few rocks. Its barrenness renders it unimportant to sailors, but its situation is not so, and was determined by M. Dagelet as lat. $23^{\circ} 34' N.$, lon. $164^{\circ} 32' W.$ According to Capt. Stauikowitch, its lon. is $164^{\circ} 47' 20''$.*

This concludes the description of the islands composing the Hawaiian Archipelago. In the subsequent paragraphs we shall include all the islands to the northward of lat. 20° , some of which lie to the eastward of the Sandwich Islands.

DETACHED ISLANDS AND SHOALS TO THE NORTH OF LAT. $20^{\circ} N.$

LOS ALIJOS, lying off the southern portion of the Californian peninsula,† is a dangerous reef, composed of four principal rocks, which in nearing them show themselves successively. The two first, much higher than the two latter, then appear alone. The highest is 98 feet, the lowest 56 feet high. They have so much the appearance of ships under sail, that such an error, easily made at night, would expose a vessel to the greatest dangers. The name of these rocks, first discovered in 1791 by Capt. Marquina, in coming from the Philippines, and not again reported until Admiral Du Petit Thouars' examination, is expressive of their dangerous character—rocks which land a ship's cargo. Lat. $24^{\circ} 57' 25''$, lon. $115^{\circ} 45' 20'' W.$ ‡

GUADALUPE ISLAND lies off the northern part of the peninsula of Lower California. It is high, with bluff shores on the North and West sides, and may be seen from the mast-head, in clear weather, at the distance of 15 leagues. From unerring indications, there is no doubt that it has been once volcanic; it is very barren on its South end, but in the northern part there are several fertile valleys, and the mountains contain vegetation. Wood and water may be obtained here from a small cove on the N.E. side of the island, and goats' flesh may be had for the trouble of shooting the animal.

The shores are free from dangers one-fourth of a mile from the island. The only anchorage is on the S.E. side, in a small cove, formed by a few rocky islets, which lie off in that direction. Here vessels may anchor in 7 fathoms water, sheltered from all winds, excepting from S.E. to E.N.E., which seldom blow here.§

This island was generally made by the Spaniards when bound to the southward from Monterey, or from their other northern establishments; in which route they pass to the westward, out of sight of those islands that form the canal of Sta.

* Voyage of La Pérouse, vol. ii. pp. 228—302; Krusenstern's Supplement, p. 112.

† Shelvoeks Island? Sir Edward Belcher says:—"On December 11, 1837, passed close to Guadalupe, and then explored a degree on the parallel where an island had lately been reported, to fall into the parallel of Shelvoes, Shelvoeks, or Shovel Island; steering easterly to Cape San Lucas, until I had sufficiently determined its non-existence within 30 miles East or West of its assigned position. The *Venus* also went over the same ground on nearly the same errand, and with like success."

‡ Voyage de La *Venus*, tome ii. p. 149.

§ Morrell's Narrative, &c., p. 106.

Barbara, for the advantage of continuing in the strength of the N.W. winds ; and thus they reach the Island of Guadalupe, from whence they steer a course for Cape San Lucas.*

REED ROCKS.—It is stated that Mr. Reed, master of the brig *Emma*, on her route from Tahiti to San Francisco, discovered, October 8 (1850 ?), two rocks, lying N.E. and S.W., one 150 fathoms long and 66 wide, the other about 100 fathoms long and 38 wide ; 5 fathoms were got on one part and 3 fathoms alongside the rock. It was thought that the sea would break on it in heavy weather. Lat. $37^{\circ} 24' N.$, lon. $137^{\circ} 27' W.$ †

FRENCH FRIGATES SHOAL (Basse des Frégates Françaises) lies to the N.W. of the Sandwich Islands, and was also discovered and named by La Pérouse, November 6, 1786, during his passage from Monterey to Macao. It is a rocky bank even with the water's edge. In a W.N.W. direction this rock is more than 4 leagues in extent ; on its N.W. extremity is an islet, or bare rock, of 100 yards in diameter, and 40 or 50 yards in height. The space between this rock and the breakers is occupied by three sand-banks, raised about 4 feet above the surface of the water. The astronomer, M. Dagelet, made the islet in lat. $23^{\circ} 45' N.$, lon. $165^{\circ} 50'$, and the eastern point of the reef in lon. $165^{\circ} 40'.$ ‡

Capt. Stanikowitch gives it the same position, and considers that the reef surrounding the small islet that La Pérouse speaks of extends to the distance of 15 miles from North to South, and nearly as much East and West.§

GARDNER ISLAND was discovered by Capt. Allen, of the whaler *Maro*, June 2, 1820. There is no doubt but that it is the same as what Morrell describes as the *Man-of-War Rock*, and the *Pollard Rock* of the Americans. According to its discoverer, it is a small island, about a mile in circumference, and about 900 feet high, having at its S.W. point two large rocks running off to the N.W. According to Morrell, it is the rocky summit of a submarine mountain, which was once volcanic, with deep water all round it, except to the S.W., where a coral reef extends half a mile out, and bare of vegetation, inhabited only by sea-birds and turtles. Capt. Stanikowitch places it in lat. $25^{\circ} 3' N.$, lon. $168^{\circ} 1' 30'' W.$ ||

TWO BROTHERS REEF was so named by Krusenstern, from the vessel which was wrecked on it. Lat. $24^{\circ} 14' N.$, lon. $168^{\circ} 30' W.$ Its existence is doubtful.¶

MARO REEF was discovered by Capt. Allen, in the American whale-ship *Maro*, in June, 1820, in lat. $25^{\circ} 24' N.$, lon. $170^{\circ} 20' W.$ Capt. Stanikowitch, who explored it in 1828, found that it was 8 leagues in circumference, and that it was visible from the deck of his vessel at 6 miles off. His position of it is

* Vancouver, vol. ii. p. 486.

‡ Voyage of La Pérouse, vol. ii. pp. 298—302.

§ Krusenstern, vol. ii. p. 44 ; Supplement, vol. iii. ;

¶ Krusenstern, vol. ii. p. 46 ; Supplement, p. 115.

† Shipping Gazette, December 23, 1850.

§ Krusenstern's Supplement, p. 112.

¶ Morrell, p. 216.

lat. $25^{\circ} 46' N.$, lon. $171^{\circ} 49' E.$ There are other determinations, also, which are not very different from these.*

LAYSAN or MOLLER ISLAND is an American discovery. Capt. Stanikowitch, not knowing that it had been previously seen, gave it the name of his vessel. It is a small, low island, inhabited, of a circular form, with a lagoon, and 6 miles in circumference. From his observations it lies in lat. $25^{\circ} 46' N.$, lon. $171^{\circ} 49' W.$ †

BUNKER'S ISLAND, according to Capt. Kotzebue, was discovered by an American, January 11, 1815, in lat. $28^{\circ} 20' N.$, lon. $172^{\circ} 30' W.$ As there is an island named *Philadelphia* in the American list, in lat. $28^{\circ} 0'$, lon. $173^{\circ} 30' W.$, it must be supposed that they are identical.‡

LISIANSKY ISLAND was discovered by Capt. Lisiansky in the Russian ship *Neva*, striking on its reef on October 15, 1805, and was nearly wrecked. According to its discoverer's description, it is a small, low island, almost on a level with the sea, exclusive of a small eminence on the eastern part. Its soil consists of coral sand, overgrown with grass and creeping plants, and full of holes. There is not any water to be found, and consequently there are no trees or shrubs. Lisiansky found several large trunks of trees thrown on to the beach. He calls the shallow S.E. part of the extensive reef, in the middle of which the island stands, the *Neva Shoal*, from his vessel. This is about $1\frac{1}{2}$ miles E.S.E. from the island from his plan.

Capt. Morrell says the island is about 6 (?) miles in circumference, and cannot be seen more than 10 miles from the mast-head. Coral reefs run off from it in two directions, and as some remuneration for their own dangers, they form a safe anchorage between them. One of these reefs runs from the North end of the island to the N.W. about 4 miles, the sea breaking on its weather side. The other reef runs off from the S.S.W. part of the island, in a S.W. direction, about 7 miles, upon the eastern side of which the sea breaks all the year round. On the West side of the island, between these two reefs, about half a mile from the shore, there is a safe and smooth harbour for ships, which may ride at anchor in from 10 to 4 fathoms water, sand and coral bottom.

In addition to this description by Capt. Morrell, there is a dangerous shoal discovered by Capt. Stanikowitch in 1827. The eastern extreme of this lies S.E. $\frac{1}{2}$ S. $7\frac{1}{2}$ miles from the N.W. part of the island, and its western extremity at the distance of 4 miles. The islands called *Laskar*, *Lasan Rys*, *Lassiano*, *Neavas*, and *Neva*, are doubtless intended for the above.§

Capt. Lisiansky places the centre of the island in lat. $26^{\circ} 2' 48'' N.$, lon. $173^{\circ} 42' 30'' W.$ Morrell gives it as lat. $25^{\circ} 29'$, lon. $173^{\circ} 44'$.

* Krusenstern, vol. ii. p. 45; Supplement, p. 110.

† Krusenstern's Supplement, p. 110.

‡ Krusenstern, vol. ii. p. 43.

§ Lisiansky, *Voyage of the Neva*, pp. 250—257; Morrell, p. 316; Krusenstern, vol. ii. p. 44; Supplement, pp. 110—102.

DELAWARE BANK.—The American brig *Delaware*, H. Hunt, lieutenant-commander, discovered a bank above the water in lat. $27^{\circ} 26' N.$, lon. $174^{\circ} 25' N.$, which, seen at some miles' distance, appeared to be 12 or 14 miles long. It is stated, also, that there are several others in the neighbourhood, many of which are not known.*

The PEARL and HERMES REEF is an extensive shoal, on which two British whale-ships, the *Pearl* and the *Hermes*, were wrecked on the same night, and within 10 miles of each other, April 26, 1822. They were cast away on the East side of the island, and were fortunate in having favourable weather for several days, which enabled them to save a great portion of their stores, and to build a vessel of about 30 tons from the wrecks; this they did in six weeks, and reached the Sandwich Islands in safety.

It was visited by Morrell in 1825, by Stanikowitch in 1827, and a plan of it is given by Capt. Duperrey. There are considerable differences in the respective positions assigned by each.

Capt. Stanikowitch says it consists of several small islands, of which the two largest are named Pearl and Hermes, encircled by a reef, through which is a passage by which the *Deliverance* passed to an anchorage near the largest of the two islands.†

Morrell says that the eastern part of the group is in lat. $27^{\circ} 41' N.$, lon. $176^{\circ} 11' W.$ From the North and South extreme points there is one continuation of small islands, covered with sand and rocks, which appear to have been once in a fluid state. The whole group presents the form of a crescent, the concave side of which, facing the W.S.W., encloses an extensive bay, with good anchorage all over it, in from 25 to 4 fathoms of water. There is an abundance of fine scale-fish in this bay, of various kinds. Turtles, seals, &c., resort to the islands. The water is very bold on the East side of this group, there being a depth of 100 fathoms within three times that distance from shore. On the West side, however, the water runs off shallow for a considerable distance to 35 fathoms. From thence it deepens very suddenly to 120 fathoms; and half a mile further off shore no soundings are to be found. The rookeries of sea-fowl on this group bear no comparison to those on Lisiansky Island, owing perhaps to the islands being so narrow, not one of them exceeding 100 fathoms in width from East to West, and all of them are destitute of vegetation. From the lava and pumice stone (?) to be seen here, I am led to believe that this whole group has been, at some distant period, one tremendous volcano. There is no fresh water to be found; but turtle and fish can be had in abundance at all seasons.‡

Capt. Stanikowitch makes its N.E. extremity in lat. $27^{\circ} 49' N.$, lon. $175^{\circ} 37' W.$, but the plan of Capt. Duperrey makes it $36'$ more to the West. Lieutenant Raper takes the determination of Stanikowitch.§

CURÉ ISLAND is an American discovery, the existence of which was con-

* *Nouvelles Annales des Voyages*, 1845, p. 235.

† *Krusenstern's Supplement*, p. 149.

‡ *Narrative, &c.*, pp. 217-8.

§ *Krusenstern*, vol. II. p. 43; *Supplement*, p. 109; *Horsburgh*, vol. II. p. 701.

firmed by Capt. Stanikowitch, of the Imperial Russian navy, in 1827. It is a small, low, and very dangerous island, which, according to Capt. Stanikowitch, is in lat. $28^{\circ} 27' N.$, lon. $178^{\circ} 23' 30''$, which differs only $11'$ from the original position. At the distance of 4 miles from the West point a reef extends for more than 6 miles to the North.

It is probably the same as those described as *Stavers, Ocean, and Massachusetts Islands* of the Americans,* and also the Dry Island, with an attached reef, of Capt. Joy.

KRUSENSTERN'S ROCK was discovered by Lisiansky, October 23, 1805. The bank around it appeared to stretch North and South about 2 miles, and the sea on it only broke in one place. Lat. $22^{\circ} 15' N.$, lon. $175^{\circ} 37' W.$ †

PATROCINIO, or BYERS' ISLAND, was discovered in 1799 by Capt. Don M. Zipiani, commanding the Spanish vessel *Senhora del Pilar*. He states its extent to be 3 miles from N.N.E. to S.S.W., and is in lat. $28^{\circ} 9' N.$, lon. $175^{\circ} 48' E.$; but the U.S. surveying vessel *Peacock* passed near this spot without seeing it. This renders it more probable that it is identical with Byers' Island of Capt. Morrell, of guano celebrity. This he places in lat. $28^{\circ} 32' N.$, lon. $177^{\circ} 4' E.$, but it is very probable that this position cannot be depended on.

Patrocinio, or Byers' Island, according to Morrell, July, 1825, is moderately elevated, and has some bushes and spots of vegetation. It is about *four* miles in circumference, and has good anchorage on the W.S.W. side, with 15 fathoms water, sand and coral bottom. There are no dangers around this island except on the S.E. side, where there is a coral reef running to the southward about 2 miles. Sea-birds, sea-elephants, and green turtles, resort to it, and plenty of fine fish may be caught on its shores with hook and line. Fresh water may be had here from the S.W. side of the island, which is of volcanic origin.‡

MORRELL ISLAND, so named by Krusenstern from its discoverer, by whom it is placed in lat. $29^{\circ} 57' N.$, lon. $174^{\circ} 31' E.$

It is a small, low island, nearly level with the water, 4 miles in circumference; it was covered with sea-fowl, and its shores were lined with sea-elephants; green turtles were in abundance (July, 1825). It is apparently of volcanic origin.

On the West side of the island there is a reef which runs off about 15 miles; while that on the S.E. extends about 30 miles in the direction of S.S.E. These reefs are formed of coral, and afford good anchorage on the S.W. side; but on the East side the water is bold close to the reef.§

CRESPO ISLAND was discovered by Capt. Crespo, commanding the Spanish galleon *El Rey Carlos*, October 15, 1801, on his route from Manila to Acapulco. As he saw it more than 10 leagues off, it must be supposed that it is not low. It

* Krusenstern, vol. ii. p. 42; Supp., pp. 109, 162. † Lisiansky, *Voyage, &c.*, pp. 257-8.

‡ Krusenstern, vol. ii. p. 43; Supplement, p. 114; Morrell, p. 218; and Wilkes, vol. v. p. 109.

§ Morrell, *Narrative, &c.*, p. 218.

is in lat. $32^{\circ} 46' N.$, lon. $170^{\circ} 10' E.$ Admiral Krusenstern says, that as the Japanese believe in the existence of an island of silver, and one of gold, it is probable that Spaniards have applied these attractive names during their search for the precious metals in the South Seas. The navigator would make a loss of time in seeking the fabulous isles of Rica de Oro and Rica de Plata, the latter term sometimes being applied to this island.

LOT'S WIFE was seen by Capt. Meares April 9, 1788, and at first was taken for a sail; and the sight of such in those seas excited much surprise. The deception, however, was so complete, that it was approached within 2 leagues before its real character was discovered by the telescope, and one of the sailors was even convinced that he saw her colours.

By noon it bore E.N.E. 4 miles distant; lat. $29^{\circ} 50' N.$, lon. $142^{\circ} 23' E.$ Greenwich. The waves broke against its rugged front with a fury proportioned to the immense distance they had to roll before they were interrupted by it. It rose almost perpendicular to the height of near 350 feet. A small black rock appeared just above the water at about 40 or 50 yards from its western edge. There was a cavern on its S.E. side, into which the waters rolled with an awful and tremendous noise.* It has been sometimes called Rica de Oro.

In all the space between this and the coasts of Japan and Formosa we have a great number of shoals and islands marked on the charts. As the existence, or at least the *positions*, assigned to many or most of these appear to be very doubtful, there is considerable difficulty in determining on the point. They would seem to have been inserted on the charts from the uncertain reckoning or observation kept on board whaling vessels, or others of that class, which, from the very nature of their pursuits, cannot be entitled to much confidence. Under these circumstances, it will perhaps be best to follow the decisions of Admiral Krusenstern, who, in the supplement to his great work, has included the greater part of them among the doubtful islands, and omitted them on his chart. We shall therefore only notice those whose existence is at all determined.

MARSHALL ISLANDS (*Los Jardines*?).—Two small islands were discovered, in 1788, by Capt. Marshall, of the ship *Scarborough*, whose name is given to the archipelago to the eastward. They have been stated to be the same as *Los Buenos Jardines* of Alvaro de Saavedra, in 1529. Another group, called *Los Jardines*, was also discovered by Villalobos in 1543, but the situation of both of these must be far away from this part, if even they could be identified. Perhaps it would be better to name them the *Scarborough Islands*. They are placed in lat. $21^{\circ} 40'$, lon. $151^{\circ} 35' E.$

MARGARET ISLANDS (*Malabrigos*), a group of three islands, discovered, in 1773, by Capt. Magee, in lat. $27^{\circ} 20'$, lon. $145^{\circ} 45'$. They have been considered to be the *Malabrigos* (bad shelter) of Bernard de Torres in 1543, but there is no possibility of deciding on the point.

GRAMPUS ISLANDS were discovered by Capt. Meares, April 4, 1788. They

* Meares, p. 97.

consist of two islands close together, and a third to the S.W. of them. The position of them is not stated by Meares, but Krusenstern deduces it from his track as lat. $25^{\circ} 40'$, lon. $146^{\circ} 40'$.

FORFANA, an island said by Galvaom to have been discovered by the ship *San Juan*, in 1543. There cannot be any doubt of its existence, though the position may be open to question. It is said to be 30 leagues E. $\frac{1}{2}$ N. of the Volcano Islands. This would give it lat. $25^{\circ} 34'$, lon. $143^{\circ} 0'$.

VOLCANO ISLANDS.—Three islands discovered, in 1543, by Bernardo de Torres, which received their name from the volcano on the central one. There can be no doubt of their being the same as the Sulphur Islands of Capt. King, in 1779. They were also seen by Capt. Krusenstern, in the *Nadifjeda*, in 1805. On the Spanish charts the northern island is called *San Alessandro*; the centre, *Sulphur Island*; and the southern, *San Augustino*. Espinosa says, that the southernmost was seen in 1804, by the Spanish corvette *La Concepcion*, and named *San Dionisio*, a name by which, according to him, it has always been distinguished by the Spanish navigators.

SAN AUGUSTINO (or *San Dionisio*), the southernmost, is a single mountain of a square form, flat at the top, and 396 feet high. Admiral Krusenstern's observations, and he was near it for two days, place it in lat. $24^{\circ} 14'$, lon. $141^{\circ} 20'$, which is $7' 30''$ South of that given by Capt. King; so that unless a fourth island lies in that latitude, a thing most improbable, we must suppose that the error arose from the distance at which it was seen in 1779.

SULPHUR ISLAND is the central one. It is about 5 miles long in a N.N.E. and S.S.W. direction. The South point is a high, barren hill, flattish at the top, and, when seen from the W.S.W., presents an evident volcanic crater; the soil of which its surface is composed exhibited various colours, a considerable part of which was conjectured to be sulphur, both from its appearance and the strong sulphureous smell perceived as the point was approached. Some on board the *Discovery* thought they saw steam rising from the top of the hill. A low, narrow neck of land connects this hill with the South end of the island, which spreads out into a circumference of 3 or 4 leagues, and is of moderate height. The part near the isthmus has some bushes on it, and has a green appearance, but that to the N.E. is very barren and full of large detached rocks, many of which were exceedingly white. Very dangerous breakers extend $2\frac{1}{2}$ miles to the East and 2 miles to the West, off the middle part of the island, on which the sea breaks with great violence. The position of Sulphur Island, according to Capt. King, identical with that of Admiral Krusenstern, is lat. $24^{\circ} 48'$, lon. $141^{\circ} 13'$.

SAN ALESSANDRO, or the North Island, is also a single mountain of considerable height, like the southern one. It is peaked and of a conical shape, lat. $25^{\circ} 14'$, lon. $141^{\circ} 11'$; variation, in 1779, $3^{\circ} 30'$ E.

The ARZOBISPO (or BONIN) ISLANDS were discovered by an English whaler in 1825, and were formally taken possession of for England by Capt. Beechey, in 1827. These clusters of islands correspond so well with a group named *Ylas del Arzobispo* in a work published many years ago in Manila, entitled,

"*Navigacion Especulativa y Pratica*," that the name has been retained in addition to that of Bonin Islands, for it is extremely doubtful, from the Japanese accounts of Bonin-sima, whether there are not other islands in the vicinity to which the name is not more applicable.*

This group had no signs of ever having been inhabited; there were neither buildings nor cultivated plants, which the Bonin-sima of the Japanese are stated to have. Besides the visit of H.M.S. *Blossom*, that of Capt. Lütke has given us many details.

The position of this group renders it exceedingly valuable; its proximity to Japan, the trade of which must some day become of immense value to Europe, and its contiguity to the great spermaceti whaling ground, on which 200 sail cruise during the summer months, make this manifest.

Its climate is excellent, the soil productive, and it was without inhabitants. In 1830 it was colonized by two white men from the Sandwich Islands, Mr. Matteo Mazarro and M. Millichamp. The latter has returned to England, but they hoisted the British flag at Port Lloyd, and landed their Sandwich Island native settlers, live stock, &c. The settlement has been repeatedly visited since that by whaling-ships, and also by one of the Chinese squadron. In the autumn of 1842 Mr. Mazarro returned to the Sandwich Islands to get more settlers, but was prevented in this. He described his little settlement as flourishing; that he had abundance of hogs, goats, and a few cattle; that he raised Indian corn and many vegetables; and that he had all kinds of tropical fruits. In fact, he could supply fresh provisions and vegetables to forty vessels annually.†

The following is Capt. Beechey's account of them :—

The group consists of three clusters of islands lying nearly N. by E., and extending from the latitude of 27° 44' 35" N. to 26° 30' and beyond, but that was the utmost limit of our view to the southward. The northern cluster consists of small islands and pointed rocks, and has much broken ground about it, which renders caution necessary in approaching it. I distinguished it by the name of *Parry's Group*, in compliment to the late hydrographer. The middle cluster consists of three islands, of which *Peel's Island*, 4½ miles in length, is the largest. This group is 9½ miles in length, and is divided by two channels so narrow that they can only be seen when abreast of them. Neither of them are navigable for shipping; the northern on account of rocks, which render it impassable even by boats, and the other on account of rapid tides and eddies, which, as there is no anchoring ground, would most likely drift a ship on the rocks. The northern island I named *Stapleton*, and the centre *Buckland*, in compliment to the professor of geology at Oxford. At the S.W. angle of Buckland Island there is a sandy bay, in which ships will find good anchorage, but they must be careful in bringing up to avoid being carried out of soundings by the current. It is named Walker's Bay, after Mr. Walker of the Hydrographical Office. The southern cluster is evidently that in which a whale-ship, commanded by Mr. Coffin,

* *Mémoire sur la Chine*, par M. Klaproth; and M. Abel Remusat, in the *Journal des Savans*, September, 1817.

† The Sandwich Islands; Progress of Events, &c., by Alexander Simpson, late H.B.M. Acting Consul, 1843, p. 124.

anchored in 1823, who was the first to communicate its position to this country, and who bestowed his name upon the port. As the cluster was, however, left without any distinguishing appellation, I named it after Francis Bailey, Esq., late president of the Astronomical Society.

PEEL ISLAND is the principal of the group, and on it are two bays, one to the S.E., which is clear and deep, except towards the head, where anchorage may be had; but of course it is open to the prevailing winds. Its head runs nearly up to that of Port Lloyd, which is on the N.W. side of the island, and facing the West.

PORT LLOYD.—*Directions for Entering.*—Having ascertained the situation of the port, steer boldly in for the *southern head*, taking care not to bring it to the northward of N. 47° E., true, or to shut it in with two paps on the N.E. side of the harbour, which will be seen nearly in one with it on this bearing. *In this position they are a safe leading mark.* To the southward of this line there is broken ground.

If the wind be from the southward, which is generally the case in the summer time, round the south bluff at the distance of 200 yards, *close to a sunken rock*, which may be distinctly seen in clear weather. Keep fresh way upon the ship, in order that she may shoot on end through the eddy winds, which baffle under the lee of the head;* and to prevent her coming round against the helm, which would be dangerous. The winds will at first break the ship off, but she will presently come up again; *if she does not*, be ready to go about, as you will be close upon the reefs to the northward, and put the helm down *before the South end of the island, off the port to the westward, comes on with the high square rock at the North of the entrance.*

If she comes up, steer for a high *Castle Rock* at the East end of the harbour, until a pointed rock on the sandy neck to the eastward of the *South* headland comes in one with a high sugar-loaf shaped grassy hill to the southward of it. After which you may bear away for the anchorage, taking care not to open the sugar-loaf again to the westward of the pointed rock.† The best anchorage, Ten Fathom Hole excepted, which it is necessary to warp into, is at the northern part of the harbour, where the anchor is marked on the Admiralty plan.

In bringing up, take care of a *spit which extends off the South end of the small island*, near Ten Fathom Hole, and not to shoot so far over to the *western* reef as to bring a rock at the *outer foot* of the *South bluff* in one with *some black rocks*, which will be seen near you to the south-westward. The depth of water will be from 18 to 20 fathoms, clay and sand. If the wind be from the northward, beat between the line of the before-mentioned *Sugar-loaf* and *Pointed Rock* westward, and a North and South line from the *Castle Rock* to the eastward. This rock, on the western side, as well as the bluff to the northward of it, may be *shaved*, if necessary. The hand-leads are of very little use in beating in here, as the general depth is 20 or 24 fathoms.

The best watering place is in Ten Fathom Hole. It is necessary to be cautious

* Keep the top-gallant clewlines in hand.

† This rock is white on the top with birds' dung, and looks like an island.

of the sharks, which are very numerous in this harbour. It is high water, full and change, at 6^h 8'; springs rise 3 feet. The station on the North side of Ten Fathom Hole is in lat. 27° 5' 35", lon. 142° 11' 31"; variation, 1° 8' E.

Some ISLANDS, three in number, have been placed on the parallel of 30°, which, though differing 3° in longitude, Admiral Krusenstern is inclined to believe but the same island. He places it in lon. 143°.

SAN MATEO; MOOR ISLAND; SYLPH ROCK.—The second of these, seen by Capt. Moor, is placed in lat. 31° 27', lon. 145° 40', on the authority of Mr. Arrowsmith. Espinosa's chart calls it *San Mateo*. It is possible that they may be the same as the *Sylph Rock*, discovered by M. Dobell, formerly Russian consul-general at Manila, in 1812; but, as he had no instruments to determine the longitude astronomically, an error of 3° may be introduced. Another island has been placed in lat. 31° 30', lon. 140° 0'. These may all be identical.

PONAFIDIN ISLAND; ST. PETER'S ISLAND.—In 1820 Lieutenant Ponafidin, of the Russian navy, discovered, in lat. 30° 29', lon. 140° 6', an island apparently formed of three hummocks, to which he gave the name of Three Hills Island, but his own is preferable. It is most probably the same as that discovered the following year by Lieutenant Povalichin, also of the Russian navy, in lat. 30° 31' 45" N., lon. 140° 24' 40" E.; this is described to be in the form of a truncated cone. The mean of these two officers' positions is lat. 30° 30' 30" N., lon. 140° 15' E.

DISAPPOINTMENT ISLAND; ROSARIO ISLAND.—Rosario Island is a small and tolerably high island, surrounded by numerous isolated rocks, which make it appear as if composed of several islands, which has been supposed by several Spanish navigators. Its position was ascertained, September 25, 1813, in the Spanish corvette, *La Fidelidad*, as lat. 27° 6', lon. 140° 35'; the pilot placed it 20' farther North. It has also been placed a degree to the westward. It is almost certain that the *Disappointment Island* seen on board the *Nautilus*, in 1801, in lat. 27° 15' N., lon. 139° 25', is one and the same island with Rosario.

DOUGLAS REEF, or PARECE VELA; NAUTILUS ROCKS, or VELA.—Douglas Reef was discovered, September 15, 1789, by Capt. Douglas, and is 5 miles in extent in a W.N.W. and E.S.E. direction, in lat. 20° 37' N., lon. 136° 10'. These rocks, and those seen by Capt. Bishop in the *Nautilus*, in 1796, in lat. 20° 15', lon. 136° 54', are probably the same as those named *Parece Vela* and *Vela*, by the older Spanish navigators. The rocks seen by the *Nautilus*, like all bare rocks, appear like a vessel under sail, and thus might have been called *Vela* (a sail), or *Parece Vela* (a sail in sight!). On Anson's chart these hold the same relative position as the Douglas and Nautilus Reefs, and therefore the name of *Parece Vela* has been added to the discovery of Capt. Douglas, and *Vela* to that of Capt. Bishop.

An American discovery has been announced as lying half a degree to the North

of these. It is possible that this may form the North extreme of a very extensive reef, of which Douglas Reef forms the West end, and Capt. Bishop's discovery the eastern extremity.

BISHOP ROCKS, discovered by Capt. Bishop, in the *Nautilus*, in 1796. They do not appear to have been seen since. Lat. $25^{\circ} 20'$, lon. $131^{\circ} 15'$.

RASA ISLAND; KENDRICK ISLAND.—The first of these is a small, low island, covered with bushes, and surrounded with rocks, 4 or 5 miles long in a N.W. and S.E. direction. It was called *Rasa* (flat) on board the Spanish frigate *Magellan*, in 1815, but it had been seen in 1807 by the French frigate *La Canonnière*. The latitude is $24^{\circ} 26' 40''$, and the mean of the two longitudes $130^{\circ} 40' E$.

Kendrick Island was discovered by an English captain of the name, in lat. $24^{\circ} 35'$, lon. $134^{\circ} 0'$. It is low, and about 2 leagues in length. It is not impossible but that it may be identical with *Rasa*, but this cannot be decided without further examination.

BORODINO ISLES were discovered by Lieutenant Ponašidin, in 1820. He places them in lat. $25^{\circ} 56'$, lon. $131^{\circ} 15'$. They are two in number, extending about 4 leagues North and South, are low, sandy, and uninhabited.

MONTAUK ISLAND (?), HARBOUR ISLAND, BUNGALOW ISLAND, and CROWN ISLAND.—We will close the descriptions of this portion of the Pacific with these reported islands, which, lying to the South of Japan, appertain more to the navigation of the China Sea than that of the Pacific. The three latter islands are placed on Arrowsmith's chart, but the authority is not named: Harbour Island in lat. $28^{\circ} 36'$, lon. $130^{\circ} 0'$; Bungalow Island in the same longitude, lat. $28^{\circ} 36'$; and Crown Island in lat. $27^{\circ} 50'$, lon. $129^{\circ} 5'$.

A singular statement has been made respecting these islands—that they form but portions of one large island. The ship *Montauk*, Capt. M'Michael, on her passage from Sydney to Shanghai, is stated to have coasted on the East side of this island, approaching sometimes within 10 or 15 miles of the shore. It is high in the middle and at the North end, where the appearance is of a coast of cliffs, with a number of small islands close along shore; the South end being low, with a reef all around. In the southern portion there is the appearance of an opening, as of the fancied channel between the parts taken for Crown and Bungalow Islands; but no such channel exists. Smoke was seen in several places; and at night many lights, as from fishing-boats.

We give this statement as it appeared in a London newspaper of August 3, 1850.

CHAPTER XXXV.

THE CORAL SEA, AUSTRALIA, ETC.

IN this the concluding chapter of the descriptions our remarks must be brief. The region it embraces is a very important one, and therefore requires, to elucidate it fully, a considerable amount of detail, which the bulk of this volume will not admit of. Moreover, as a great portion of the Australian navigation is confined to its own localities, our remarks need not extend beyond pointing out those dangers which a ship passing to or from the Pacific to its principal ports will encounter. All beyond this is left for a future work.

THE CORAL SEA.

The north-eastern coast of Australia, and the adjacent sea, are the most dangerous parts of the Pacific. From its character, Capt. Flinders proposed, in the second volume of his voyage, that it should be called the "Coral Sea," a most appropriate and expressive name, now generally recognised. Admiral Krusenstern was the first to use it, and in so doing expresses his admiration of the man whose indefatigable exertions and high scientific attainments have placed Australian hydrography in the eminent position it holds.

The limits of the Coral Sea, as proposed by Capt. Flinders, are the South coast of New Guinea and the Louisiade to the northward; to the West, the northern part of Australia, from Torres Strait to Sandy Cape; southward, from the latter point to the Isle of Pines, South of New Caledonia, which may be taken as its eastern limit.

The LOUISIADE ARCHIPELAGO has been before alluded to (page 1018), and the North side of it described. The South side, at first very cursorily examined by Bougainville, has been more minutely examined by D'Urville in 1840, and by our Admiralty surveyors, the lamented Capt. Stanley and Lieutenant Yule, in the *Rattlesnake* and *Bramble*.

ADZLE ISLAND, a small coral bank, crowned with a tuft of trees, marks the S.E. extremity of this archipelago, and is in lat. $11^{\circ} 25'$, lon. $154^{\circ} 34'$. It is connected with Cape Deliverance, lat. $11^{\circ} 23' 25''$, lon. $154^{\circ} 16'$, on Rossel Island, by a continuous line of coral reefs. The whole of this southern coast is protected by an almost impenetrable line of coral reef without any opening; but, unlike the dangerous labyrinth off the coast of Australia, it has no outlying dangers. Coasting along its outer edge is therefore not attended with any danger. Now, therefore, that the surveys of Torres Strait and its channels have been surveyed, and will soon be before the world, this coast offers an easy and safe line of approach to that important strait. ILLE SUN-EST, or *South-East Island*, is very high, and its South side is protected by the coral barrier reef. Two openings

were found through this reef by the *Bramble*, between the S.E. point and the *Conde Peninsula* (lat. $11^{\circ} 39'$, lon. $153^{\circ} 37'$), through either of which there is a clear channel to the sea. The reef continues, though its edges were not all examined by D'Urville, to the *Duchâteau Islands*, lat. $11^{\circ} 15' S.$, lon. $152^{\circ} 28'$. There is very good anchorage under the lee of these islands, and here the continuous line of barrier reef appears to terminate, leaving clear passages between the reefs which surround the islands and groups forming the S.W. part of the Louisiade. The *Duchâteau Islands* are not permanently inhabited, but are only visited occasionally for the purpose of obtaining turtle. While the *Bramble* was here they came off in great numbers from the larger islands, bringing cocoa-nuts and yams in great quantities for barter.

At *Ouessant Island*, lat. $11^{\circ} 10'$, lon. $151^{\circ} 20'$, the barrier reef trends more to the N.W., and to the northward is the *S.E. Cape of New Guinea*, in lat. $10^{\circ} 42'$, lon. $151^{\circ} 9'$. The *Brumer Islands* lie in lat. $10^{\circ} 48'$, lon. $150^{\circ} 36'$. There is anchorage here under their lee, and the natives will bring yams and cocoa-nuts for barter. There is also anchorage at *Dufaure Island*, lat. $10^{\circ} 34' S.$, lon. $150^{\circ} 0'$; the natives were friendly and similar to those to the eastward. To the northward of this is Bougainville's *Cul de Sac de l'Orangerie*; and here, when the weather is clear, the magnificent range of mountains which form the axis of this portion of New Guinea becomes visible. Many of the peaks are as high as that of Teneriffe, and they follow the general trend of the coast to the North and East.

It will be needless to follow the detail of the coast to the westward, as all information respecting it can only be useful in connexion with the description of Torres Strait; suffice it to say, that, at *Cape Rodney*, lat. $10^{\circ} 15'$, lon. $148^{\circ} 31'$, and *Point Hood*, lat. $10^{\circ} 7\frac{1}{2}'$, lon. $147^{\circ} 50'$, the coast bears to the northward, forming an extensive bight, whose West extreme will be found at the narrowest part of Torres Strait.

The BARRIER REEFS of the Australian coast, it would be a fruitless task to endeavour to describe in few words. Their wonderful intricacy, and extremely dangerous character, can be best appreciated by an inspection of the charts. All remarks will be reserved for another place; and we shall proceed to enumerate those detached dangers and shoals which bestrew the Coral Sea. But previous to doing so, it is proper to state that their positions and character do not all rest on equally good evidence. And a very minute, connected, and extensive examination must be made before it can be said that the dangers of this sea are properly and fully understood.

FARQUHAR GROUP.—This is a collection of islands and reefs occupying a large space, parts of which have been discovered at separate times, and reported as distinct dangers. The entire group consists of seven low sandy islets, connected by reefs, three of which are covered with bushes. It was discovered, in 1821, on board the French ship *Le Trois Frères*, commanded by M. Tregosse, in company with the English brig *Jessie*. At the eastern part of the group these islets are on the meridian of $151^{\circ} 47'$, and that at the West end is in lat. $17^{\circ} 39'$, lon. $151^{\circ} 27'$. There is no doubt but that the dry bank discovered by Lieutenant Vine, in lat. $17^{\circ} 45'$, lon. $151^{\circ} 40'$, is a portion of it. A reef has also been stated to

have been discovered by Capt. John Lihou, R.N., in the *Zenobia*, in 1823, in lat. $17^{\circ} 25' S.$, lon. $151^{\circ} 45'$, extending 46 miles in a N.N.E. and S.S.W. direction; this is evidently the same as the Governor Farquhar group, which may reach as far as the Alert Shoal.

TREGROSSE ISLETS.—Two small islets, discovered by Capt. Tregrosse, as above, to the West of the Farquhar group, the westernmost in lat. $17^{\circ} 42'$, lon. $150^{\circ} 43'$. The westernmost reef is in lat. $17^{\circ} 44'$, lon. $150^{\circ} 32'$. M. Tregrosse steered through a passage 5 or 6 miles wide, which appeared safe.

A DANGEROUS REEF lies in lat. $16^{\circ} 52'$, lon. $149^{\circ} 50'$, according to Capt. T. B. Simpson.

The OSPREY SHOAL, discovered in 1844, lies in lat. $14^{\circ} 42'$, lon. $146^{\circ} 30'$.

The TWO SHOALS of BOUGAINVILLE are dangerous, and were first seen by that navigator, June 6, 1768. The first is in lat. $15^{\circ} 17'$, lon. $147^{\circ} 57'$; the second in lat. $15^{\circ} 35'$, lon. $148^{\circ} 6'$.

DIANA BANKS are a small sandy islet, awash, and surrounded with rocks, also discovered by Bougainville. Lat. $15^{\circ} 41'$, lon. $150^{\circ} 25'$.

MELLISH BANKS and KAYS, discovered in 1812, by Capt. A. Bristow. The highest part of this is about 8 feet above water. It is quite steep-to, no bottom being found in many parts within a ship's length of the breakers. Numerous sea-birds, boobies, &c., on it. The centre is in lat. $17^{\circ} 16'$, lon. $156^{\circ} 12' E.$ It is most likely identical with *Young's Reef*.

ALERT SHOAL was discovered by Capt. Brodie, of the *Alert*, October 4, 1817. It is composed of two sandy islets, surrounded by a dangerous shoal, which extends a long distance to the South. Lat. $17^{\circ} 2' S.$, lon. $151^{\circ} 49' E.$

BAMPTON SHOAL was discovered June 2, 1793, by the vessels *Shah Hormuzeer* and *Chesterfield*. It is of a horse-shoe form, of a very considerable extent, a line of sand-hills and breakers, having an opening to the S.E., leading to an extensive enclosed bay, with 30 to 80 fathoms in it. At the S.W. end are two small islands with trees, called the *Avon Isles*. They are in lat. $19^{\circ} 30' S.$, and lon. $158^{\circ} 10'$.

DAVID REEF is in lat. $19^{\circ} 20'$, lon. $151^{\circ} 0'$, according to the chart.

HORSE-SHOE SHOAL.—A discovery of Lieutenant Vine. Its northern extreme is in lat. $20^{\circ} 5' S.$, lon. $51^{\circ} 50'$. The convex side is to the southward, extending 15 miles to the South and East.

FREDERICK REEF, 18 leagues in extent, a curve, the convexity facing the South, discovered, in 1812, by a vessel whose name it bears. Lat. $20^{\circ} 45'$, lon. $154^{\circ} 15' E.$

MINERVA SHOAL.—A bank seen by the vessel whose name it bears, July 8, 1818; the depth found was not less than 8 and 10 fathoms, but there is no doubt that there are some spots which might be dangerous. When on the shoalest part the ship was directly between the Booby and Bellona Shoals, as marked on Flinders' chart. Lat. $20^{\circ} 41'$, lon. $159^{\circ} 30'$.

BOOBY SHOAL.—A discovery of Lieutenant Ball, in the *Supply*, 1790. Lat. $21^{\circ} 2'$, lon. $159^{\circ} 2' E.$

BALL SHOAL, another discovery of the same period, in lat. $21^{\circ} 0'$, lon. $160^{\circ} 36'$.

BELLONA SHOAL, discovered, in 1793, by the ship *Bellona*. It may be a portion of the group. Its position is very vaguely determined as lat. $20^{\circ} 54'$, lon. $159^{\circ} 47'$.

CLAUDINE'S REEF, seen in 1820, bearing 6 miles West from the South end of Booby Island or Shoal, having a clear passage between them. Lat. $21^{\circ} 19' S.$, lon. $159^{\circ} 4'$.

All these last five reefs apparently form a cluster by themselves, and it is more than probable that many undiscovered dangers exist, and that many of the isolated observations made on their discovery will prove to be very erroneous.

WELSH BANK, on Capt. King's chart, is placed in lat. $21^{\circ} 15' S.$, lon. $153^{\circ} 56'$.

KENN'S REEF, discovered April 3, 1824, by Capt. Kenn, of the ship *William Shand*, consists of rocks and sand, partly above water; it is 9 miles long S.E. and N.W. Its centre is in lat. $21^{\circ} 9' S.$, lon. $155^{\circ} 49' E.$

SAUMAREZ SHOALS were seen in the *Zenobia*, Capt. Lihou, February 27, 1823. The North extreme is a dry bank, and it was supposed that other reefs existed to the N.W. of this. The shoal extends N. by W. and S. by E. from lat. $21^{\circ} 35' 30''$, to $21^{\circ} 44' S.$, lon. $153^{\circ} 46'$.

MIDDAY REEF, discovered by Capt. R. Carns, in the *Neptune*, June 20, 1818. Its position, western end, was well determined, lat. $21^{\circ} 52' S.$, lon. $154^{\circ} 20' E.$ It extends to the East as far as could be seen from the mast-head, consisting of sand-banks and rocks, some just visible above water, others elevated from 5 to 20 feet. There seemed to be several passages between the banks.

WRECK REEF takes its name from the loss of the *Cato* and *Porpoise* on it in the night of August 15, 1803. It is 7 leagues long E. and W., and forms six coral reefs. The easternmost is covered with wiry grass and some shrubs, and was called *Bird Islet*. The spot where the wreck occurred, according to Capt. Flinders, who was on board, is in lat. $22^{\circ} 11'$, lon. $155^{\circ} 19'$. The chain extends from lon. $155^{\circ} 7'$ to $155^{\circ} 28'$. It is high water here at $8^h 45'$, rise 6 or 8 feet; variation, $9^{\circ} 17' E.$

AUSTRALIA REEF, discovered by Capt. Slight, 1824. It cannot be seen far off, as the sea is very smooth around it at times. Lat. $22^{\circ} 45'$, lon. $156^{\circ} 6'$.

CATO BANK, discovered by the ships *Porpoise* and *Cato*, August 15, 1803. It is a dry sand-bank, small, and without vegetation. Innumerable birds flock around it. Its situation, according to Capt. Flinders, is in lat. $23^{\circ} 6' S.$, lon. $155^{\circ} 23'$.

CAPEL BANK.—A deep coral shoal, discovered by H. M. sloop *Hyacinth*, June 8, 1835. The least depth found on it was 32 to 40 fathoms, red and white coral, and white sand. Lat. $24^{\circ} 14' 51'' S.$, lon. $159^{\circ} 18' 15''$. Its whole extent was not ascertained.

To the westward of New Caledonia there appears to be a series of detached shoals, which run in a direction somewhat parallel to that of the mountain ridges which compose that large island and its reefs. Perhaps there may be some geological connexion between this parallelism, and more dangers may be found in the same line.

The dangers hitherto announced are as follow :—

GRIMES' SHOAL, placed on Norie's chart, 1825, without a name, in lat. $23^{\circ} 53' S.$,

lon. $165^{\circ} 10' E.$, is made by Capt. Grimes, of the *Woodlark*, to be 25 miles West of this, so that its longitude may be about $165^{\circ} 0' E.$ He describes it as having 10 fathoms least water on it.*

HAMOND ISLAND.—An island announced *from report* (without a name), by Commander Hamond, R.N. We have therefore placed his name to it. It is in lat. $22^{\circ} 30' S.$, lon. $162^{\circ} 51' E.$

TAMAR REEF.—A dangerous shoal, on which the *Tamar* of Sydney struck, in lat. $21^{\circ} 21' S.$, lon. $161^{\circ} 36' E.$ It is reported to extend a long distance to the N.W.; perhaps it is connected with the following.

A SHOAL in about lat. $20^{\circ} 5' S.$, lon. $160^{\circ} 30' E.$, as reported to Capt. Simpson.

The NEW SHOAL, as it is called by the whalers, is very imperfectly laid down on the chart, as different authorities vary greatly as to its position; it is said to be in lat. $20^{\circ} 55' S.$, lon. $160^{\circ} 28' E.$ It is covered, but the sea breaks very heavy on it.†

MIDDLETON ISLAND is very high, with a remarkable peak. Its position is doubtful. Capt. Flinders informed Mr. Purdy that he was uncertain of its place. Mr. Purdy makes it in lat. $27^{\circ} 58'$, lon. $159^{\circ} 30'$. Capt. Flinders places it a degree to the eastward.

MIDDLETON SHOALS.—An extensive reef, also doubtful as to situation, is placed in lat. $29^{\circ} 10'$, lon. $158^{\circ} 22'$.

ELIZA REEF, on which the *Eliza* was wrecked in 1831, is in lat. $29^{\circ} 30' S.$, lon. $158^{\circ} 30'$, from the observations of the *Fairy* cutter, sent from Sydney to examine the wreck.

SERINGAPATAM and ELIZABETH SHOAL, discovered by the ships *Claudine* and *Marquis of Hastings*, 1820. It appeared to be of a circular form, 3 miles in circuit, with deep water in the centre, and a few rocks, like negro heads, on the edges, which elsewhere are covered, the sea running high over them. Lat. $30^{\circ} 5'$, lon. $159^{\circ} 0'$.

FAVOURITE SHOAL, doubtful, is placed in lat. $26^{\circ} 6'$, lon. $160^{\circ} 0'$.

LORD HOWE'S ISLAND was discovered February 17, 1788, by Lieutenant Ball, commanding the *Supply*.‡ It is about 6 miles long, N.N.W. $\frac{1}{2}$ W. and S.S.E. $\frac{1}{2}$ E. On the N.E. and eastern parts are several islets and rocks from 1 to 2 miles' distance. There is a small settlement on the North end, according to Capt. Bethune, where pigs and potatoes may be got in small quantities. The *Admiralty Rocks*, on the North side of the island, are dangerous. The highest part of the island is called *Mount Gower*, and is about 2,500 feet high, visible 20 leagues off.

* Nautical Magazine, February, 1844, p. 90.

† *Ibid.*; November, 1848, p. 574; July, 1847, p. 370.

‡ Hunter's Historical Journal.

BALL'S PYRAMID lies about 10 miles S.E., by compass, from Lord Howe's Island. This, too, may be seen at 12 leagues' distance. It is a rock surrounded by other and dangerous rocks. There appears to be an islet or two off its N.W. end. The reefs on its South side are dangerous. The channel between Ball's Pyramid and Lord Howe's Island appeared to be clear. Capt. Bethune, in H.M.S. *Conway*, made the latitude of the islet off the N.E. end of Lord Howe's Island to be in $31^{\circ} 22' 35''$ S., and the longitude of Ball's Pyramid, $8^{\circ} 5' 59''$ E. of Port Jackson, or $159^{\circ} 24'.$ *

The **COAST of AUSTRALIA**, to the northward of Sandy Cape, is fronted with the innumerable coral reefs previously alluded to. Horsburgh therefore recommends this cape to be taken as a point of departure, and, in proceeding to the northward, not to go to the eastward of its meridian.

SANDY CAPE is in lat. $24^{\circ} 42'$, lon. $153^{\circ} 20'$, according to Flinders. It is the North extremity of an extensive sterile island, called *Great Sandy Island*. The eastern point of this, *Indian Head*, was thus named by Cook, in 1770, from the crowd of natives on it. It is in lat. $25^{\circ} 1'$, lon. $153^{\circ} 26'$. To the S.E. of it a bank of 9 fathoms has been reported, *Gardner Bank*, in lat. $25^{\circ} 25'$, lon. $154^{\circ} 0'$.

CAPE MORETON is the next point of importance to the southward. It is in lat. $27^{\circ} 1'$, lon. $153^{\circ} 30'$. It is the N.E. point of Moreton Island, and visible from a ship's deck 8 leagues off; when first seen it appears detached, as the land between it and the higher parts of the island is very low. The North channel into Moreton Bay is about a mile to the northward of this, and to the southward of *Flinder's Rocks*, the only outlying danger, 3 miles N.N.E. from the cape. The channels are buoyed, and whalers will find it a good place for wood and water.

CAPE BYRON is the easternmost cape of Australia. It is in lat. $28^{\circ} 38'$, lon. $153^{\circ} 40'$. It is a small steep head, projecting 2 miles from the low land, and in coming along the coast makes like an island. There are three rocks on its North side; and at 8 or 9 leagues in a N. 57° W. direction from it is *Mount Warning*, the peaked top of a mass of mountains, 3,300 feet high, the highest land on this coast.

The coast to *Shoal Bay*, a small plain 50 miles to the southward, is mostly low and sandy, and the soundings at from 2 to 4 miles off vary from 10 to 32 fathoms, sandy bottom. There is nothing particular on the coast.

SMOKY CAPE, in lat. $30^{\circ} 56'$, lon. $153^{\circ} 6'$, has three hummocks standing upon so many projecting points. Southward of it the coast is generally low and sandy, but its uniformity is broken at intervals by rocky points, which at first appear like islands.

The **THREE BROTHERS** are an excellent landmark for this coast.. These three hills lie from 1 to 5 miles behind the shore, at the eastern extremity of a range of land, coming out of the interior country. The northernmost hill is the broadest, most elevated, and nearest the sea, visible 50 miles from a ship's deck. It is in lat. $1^{\circ} 43'$, lon. $152^{\circ} 47'$.

* Nautical Magazine, November, 1840, p. 780.

The entrance to PORT MACQUARIE is in lat. $31^{\circ} 25'$, lon. $152^{\circ} 57'$. The bearing of the Brothers will point out its position, which is also marked by a signal station.

PORT STEPHENS is an excellent harbour. Its entrance opens between two high headlands, Yacabah and Tamarec. The land is remarkable about this part, as the hills near its mouth, when seen at 6 or 7 leagues from the S.E., appear like a group of islands in the form of sugar-loaves. Barroinee Point is in lat. $32^{\circ} 40' 45''$, lon. $152^{\circ} 4' 15''$.

PORT HUNTER, important on account of the coal mines it contains, is 8 leagues W.S.W. of Port Stephens. The court-house of the town of Newcastle is in lat. $32^{\circ} 55' 50''$, lon. $151^{\circ} 48' 45''$.

BROKEN BAY, into which the River Hawkesbury falls, is so called from the appearance of its shores. It contains several excellent anchorages. The South part is in lat. $33^{\circ} 34'$, lon. $151^{\circ} 20'$.

PORT JACKSON is the principal harbour on this side of the Pacific, and well deserves the pre-eminence it has attained. It is easy of approach, and affords every advantage as a port. The following are Capt. P. P. King's directions :—

Port Jackson is a safe and excellent harbour ; a ship may run in between the heads without fear, for the passage is clear, the coast pretty steep on both sides, and as the sea breaks on the rocks, even in fine weather, it shows all those that are a little detached from the shore.

On the Outer South Head stands the lighthouse or Macquarie tower. It is near the edge of the highest cliff, which is 255 feet in height. It is 100 feet high, so that the light is 355 feet above the sea at low water. It revolves in every half minute, and is excellent. It may be seen from the eastward from all points between S. by E. and N. by E. by compass. The lighthouse stands in lat. $33^{\circ} 51' 11''$ S., lon. $151^{\circ} 18' 12''$. On the same high ridge, and about a quarter of a mile more to the northward, stand a flag-staff and semaphore, which communicate with Sydney.

About $1\frac{1}{2}$ miles N.N.W. (*magnetic*) from the lighthouse, the ridge breaks down to a low rocky point, called the Inner South Head, from which a broad reef projects more than a cable's length ; but as from this point the Inner and Outer Heads bear N.N.E. and N.E. by E. (*magnetic*), and are three-quarters of a mile and 1 mile distant, there is abundant room to work into the mouth of the harbour. If the wind hang from the southward, it would be imprudent for a stranger to work past the Sow and Pigs, the only danger of importance in Port Jackson ; he may therefore anchor anywhere between the Middle and South Heads, according to the wind, and wait there for a pilot, who readily comes on board when the signal has been made in the offing. •

To sail in with a leading wind, steer for Middle Head, a projecting cliff that faces the entrance, until the harbour opens round the Inner South Head, half a mile inside of which lies the Sow and Pigs, or Middle Ground. This is a bank of sand and rocks about 400 fathoms in length, and 150 in breadth, its length being in the direction of the harbour. A small portion of it is dry, and consists of a few rocks, upon which the sea almost always breaks ; they form the outer end of

the shoal, and are in the line of bearing of the Outer North and Inner South Heads. The south-western tail of the bank is chiefly sand, with rocks scattered about; but on the greater portion of it there are 12 feet water, which gradually deepens to $3\frac{1}{2}$ fathoms beyond the rocky limits of the shoal. There is a safe channel on either side, and the choice must depend on the direction of the wind.

Whatever danger there may have been in former times from this shoal, they have been all obviated by the *light-vessel* which was moored on it in August, 1836. It is moored in 22 feet (low water, spring tide), at the distance of 190 yards N.W. (by compass) from the beacon on the dry part of the Sow and Pigs Shoal, and at about 60 yards outside of a rock detached from the shoal, in the direction of the beacon, over which there are only 7 feet water, and will exhibit *two lights* placed one over the other.

The following directions were given by Mr. Nicholson, the harbour master, at the time of placing the vessel :—

In entering with a southerly wind.—Being at half or three-quarters of a mile from the shore under the lighthouse, steer N.W. until the light-vessel is seen over the extremity of the Inner South Head, then haul up to W.N.W. until it bears to S.W., which will lead clear of the Inner South Head; haul to the wind, keeping the light-vessel on the larboard bow; pass her on the larboard hand, and in turning to windward between the shoal and the land, come no nearer the former than to bring the flat-roofed house (being the third to the right or to the westward of the windmills) in sight over the bluff of Point Bradley. When the lighthouse bears S.E. by E. $\frac{1}{2}$ E. a ship is to the southward of the shoal. Another mark for having passed the shoal is, the rock called the Bottle and Glass, under a conspicuous road on the hill. By night, the mark for turning up the channel, between the Sow and Pigs and the shore, is to keep the light-vessel to the East of N.E. $\frac{1}{2}$ N.; but on approaching George's Head, vessels should stand no nearer the 3 fathom knowl than to get the light to bear N.E. until the lighthouse bears S.E. by E. $\frac{3}{4}$ E.

The least water on the knowl is sixteen feet at low water.

With a fair wind.—Enter as before directed; pass the light-vessel as close as convenient, and steer towards George's Head until the westernmost windmill is over the bluff of Bradley Point. This mark will lead over the deepest channel. In entering by night, after passing the light-vessel, steer S.W. $\frac{1}{2}$ W. until beyond the line of bearing, between the lighthouse and George's Head, or until the former bears S.E. by E. $\frac{3}{4}$ E.

In rounding *Point Bradley*, which is about $1\frac{1}{2}$ miles above George's Head, you must avoid a rocky shelf that runs off the point for perhaps half a cable's length. You may pass on either side of *Pinchgut Island*; but when hauling into Sydney Cove, a wide berth must be given to a reef, which extends from point Bennilong for rather more than a cable's length, and which should not be approached nearer than in 8 or 9 fathoms water, till the eastern side of the cove is open to view.

If absolutely necessary to work through either of the channels without a pilot, go no nearer to the Sow and Pigs than $3\frac{1}{2}$ fathoms at low water, unless the vessel is small, nor within a cable's length of the shore, for although it is bold in most

parts, yet there are some straggling rocks off the South point of *Watson's Bay*, and also round *Shark's Island*.

There is good anchorage in all parts of the harbour when within the middle head. There is also anchorage in North Harbour, but not to be recommended, for the swell sometimes rolls heavily in there; but no swell can affect the anchorage between Middle Head and the Sow and Pigs.

SYDNEY COVE is nearly half a mile long and 200 fathoms wide, and would contain upwards of twenty ships swinging at their moorings. The shores are bold-to, and, excepting the rocky shoals that extend off Point Bennilong and Point Dawes, ships may approach very near.

The tide rises from 6 to 8 feet, and at full and change it is high water in Sydney Cove at 8^h 30', but at the heads it precedes this time by a quarter of an hour. The variation of the compass observed at Sydney Cove, in 1822, was 8° 42' E.; at Garden Island, 9° 6'; and at Camp Cove, 9° 42'.

If a ship bound to Port Jackson should, from want of observations, be uncertain of her latitude, and fall in with the land either to the southward or northward of it in blowing weather, she may find shelter in Botany Bay or in Broken Bay, as circumstances require. The former is about 3 leagues to the southward, and the latter about 5 leagues to the northward of Port Jackson; and it is of the utmost consequence that such ships as may happen to be in bad condition, and unable to keep off shore, should be aware of these useful places of refuge.

BOTANY BAY is about 9 miles South of the entrance of Port Jackson. The entrance is clear, and lies between *Cape Banks* and *Cape Solander*, the latter in lat. 34° 0' 45" S., lon. 151° 15' 50". Steer through mid-channel, and anchor on the North shore.

JERVIS BAY is in lat. 35° 7'. It is formed to the North by Cape Perpendicular, formed of high cliffs, with a flat summit, without tree or shrub, in lat. 35° 6' 28", lon. 151° 2'. This entrance is 1½ or 2 miles wide.

CAPE GEORGE, in lat. 35° 10', lon. 150° 59', is to the southward of Jervis Bay, and is the best landfall to make on this coast, particularly in thick or hazy weather, when ships are uncertain of their latitude, it being no more than 25 leagues from Port Jackson.

CAPE DROMEDARY is in lat. 36° 18', and has a double mountain over it, which Cook thence called Mount Dromedary. It is high, and may be seen 20 leagues off. Six miles to the eastward is *Montague Island*, 2 miles long, with anchorage to the West.

TWOFOLD BAY is a place of some interest, as a new town, *Boyd*, is springing up. On Toraraga Point a landmark, called the Wanderer's Tower, has been erected, which may easily be seen 15 miles off, and points out the position. Point Brierly, according to Capt. Stokes, is in lat. 37° 6' 40", lon. 149° 57' 42", and lies between East and West Boyd.

CAPE HOWE is the S.E. extremity of Australia, and the North side of the entrance to Bass's Strait. It is a low point of rocks and sand, with a small island close to it.

The *lighthouse* is on *Gabo Island*, 5 miles to the S.W. of the cape. It is

about $1\frac{1}{2}$ miles long, with anchorage on its S.W. side for small vessels, but no channel inside it.

BASS'S STRAIT, as is well known, separates Australia from Van Diemen's Land. On the South side is a group of islands, of which Flinders' or Great Island is the principal. To the N.W. of this is a small cluster, the *Kent Group*; on the eastern part an excellent and conspicuous lighthouse has been erected (in 1846). The light is 890 feet above the sea; revolves once in fifty-four seconds, and has been seen 37 miles off.

BANKS STRAIT lies to the North of the N.E. point of Van Diemen's Land. On *Swan Island*, on its South side, is a lighthouse, showing a flashing light, two and a half seconds in every five minutes, visible 30 miles off. It is 104 feet above the sea.

EDDYSTONE POINT is the first marked projection on the East coast of Van Diemen's Land. It is lofty, and in the interval between the Swan Islands are two groups of singular peaked rocks, like villages. *St. Helen's Point* is 19 miles South of Eddystone Point; the coast here presents several remarkable points of a pyramidal shape in the interior. There is a ledge of rocks above water, reaching a league off the cape. *Maurouard Island*, to the South of the cape, affords some fresh water.

FREYCINET PENINSULA and **SCHOUTEN ISLAND** are high, steep, and barren to the eastward, and from these irregularities, at a distance have the appearance of a chain of islands. *Fleurieu Bay*, to the West of them, affords good anchorage anywhere.

MARIA ISLAND consists of two peninsulas; the bay to the East, named *Reidlé Bay*, is a bad anchorage to stay in, as it is open entirely to the East and South. The *Pyramid*, off the South end of the island, is in lat. $42^{\circ} 45'$, lon. $148^{\circ} 3'$.

CAPE PILLAR is the most remarkable land on the coast, being a series of perpendicular basaltic columns, rising to a great height, with a flat surface. A high island, *Tasman's Island*, of similar appearance, lies close to the South of it. It is in lat. $43^{\circ} 12'$, lon. $148^{\circ} 0'$.

STORM BAY, the eastern entrance to Hobarton, is between Cape Pillar on the East, and Tasman's Head to the S.W. They are 35 miles apart, N.E. by E. and S.W. by W.

In the N.W. corner of *Storm Bay*, between Cape Sortie, the North end of *Bruny Island*, and *Cape Direction*, lies the mouth of the *River Derwent*. Seven miles north-eastward from Cape Direction is the mouth of *North Bay*, leading to *Pitt Water* and *Norfolk Bay*. On the western shore is *Adventure Bay*, the South point of which, named *Fluted Cape*, is high, steep, and projecting, composed of basaltic columns, and covered with trees; and adjacent to its northern part is *Penguin Island*, of moderate height, and also covered with trees. This bay is a good place of shelter from S.W. and westerly gales of wind.

RIVER DERWENT.—The entrance of this river, between Cape Sortie and Cape Direction, is about 2 miles wide, and continues of the same breadth for 5 miles, to the South point of *Double Bay*, which extends 6 miles North and South, and $2\frac{1}{2}$ miles in depth; with an entrance of $1\frac{1}{2}$ miles wide, and the soundings from 7 to 2 fathoms.

HOBARTON stands on the West bank of the river, about 10 miles from Cape Sortie; it is situated on a gently sloping plain, at the foot of the Mount Table, and is nearly a mile in length, from North to South. Fort Mulgrave, on the South point of Sullivan Cove (the port of Hobarton), is in lat. $42^{\circ} 53' 35''$ S., lon. $147^{\circ} 21' 30''$ E.; variation of the compass, $9^{\circ} 10'$ E.

Ships from the westward, bound into the Derwent through Storm Bay, ought to give Tasman's Head a good berth in order to avoid the islands and rocks lying off it. In proceeding northward past Fluted Cape, the most remarkable object will be the Mount Table, which is very high, and in appearance resembles the mountain of the same name at the Cape of Good Hope.

In advancing up the bay, Betsy's Island, which is high, soon appears in sight, and will enable you to steer for a small rocky islet named the Iron Pot, between which and Cape Direction there is only a boat-passage. *Iron Pot Island* is marked by a *lighthouse*, which at night exhibits a fixed light at about 70 feet above the level of the sea, and may be seen at 5 leagues off.

Having now entered the Derwent, steer about N. by W. for a low, sloping point on the larboard hand, and when abreast of it the town will open in view to the westward.

There is no danger all the way up, and ships may stand within half a cable's length on either side; the holding ground is good in every part, and the depth of water nowhere exceeds 18 fathoms. The anchorage is called Sullivan Cove, although it is merely a bend of the land; but the low, sloping point before mentioned shelters the shipping from the sea; though there is a long fetch from the S.E., which, when it blows hard from that quarter, causes a short breaking sea.

BRUNY ISLAND forms the western side of Storm Bay, and to the West of this again is another channel, D'Entrecasteaux's Channel. *Tasman's Head* is the S.E. point of Bruny Island. There are some rocks off it called the *Boreels*, the S.W. of which are called the *Friars*, in lat. $43^{\circ} 32'$, lon. $147^{\circ} 21'$. They are bare pyramidal rocks.

CAPE BRUNY is the S.W. cape of the island, and on it a *lighthouse* was erected in 1838. The following directions were issued with the notice:—"The top of the light upon Cape Bruny is 339 feet above high-water mark. The tower, which is quite white, is 44 feet high, and forms a good landmark by day; the machinery makes a complete revolution every five minutes; the alteration, however, from light to shade, takes place every fifty seconds, and this forms the distinguishing characteristic of the light.

"Vessels coming from the westward, unless a pilot has got on board, are recommended in no case to pass between the Actæon Reefs and the western shore; but, having arrived abreast of the Whale's Head, they are to bring that head to bear S.W. by W. $\frac{1}{4}$ W. by compass, and not open it to the southward of that bearing before the lighthouse on Cape Bruny bears N. by E. $\frac{3}{4}$ E. by compass, at which time the S.E. break, or part of the Actæon Reefs, will bear W. $\frac{3}{4}$ N. by compass, distant $2\frac{1}{2}$ miles, which must not be approached nearer, unless the vessel be in charge of a pilot; from that position the steering N. by W. by compass, will keep them in mid-channel, where no danger exists.

"In baffling or working winds, vessels are to keep on the eastern shore, which

may be approached boldly. Several reefs and rocks being on the western shore higher up than the Actæon Reefs, it will be necessary to approach that shore with great caution until you open Muscle Bay, and the light on Bruny is brought to bear E. $\frac{1}{2}$ S.

"The S.W. break, or part of the Actæon Reefs, bears from the Whale's Head N.E. $\frac{1}{2}$ N. by compass, distant $6\frac{1}{2}$ miles, and from the S.E. Cape, N.E. $\frac{1}{2}$ E. by compass, distant 3 miles. Vessels working in the channel must be careful to keep the lead going, and not approach the Actæon Reefs to less soundings than 20 fathoms.

"After the vessel is above Muscle Bay, the shore on either side may be approached to half a mile."

The tides in the Derwent, and all throughout D'Entrecasteaux's Channel, seem to be very irregular; at times they rise 8 or 10 feet, at others 4 or 5 feet, and sometimes there is said to be no fall of tide for two or three days together. The stream is likewise irregular, but the ebb in general runs at the rate of 2 or 3 miles an hour. Capt. Flinders surveyed the River Derwent, in December, 1798, and in speaking of the tides he says: "In Risdon Cove the tide rises between 4 and 5 feet, which is more by at least a foot than at the entrance of the river. The time of high water is about eight hours after the moon's passage over the meridian, or one hour later than in Adventure Bay. In the narrow parts above Sullivan Cove, the tides run with tolerable regularity, and with some degree of strength; but towards the entrance of the river, the water at the surface sometimes ran down twelve hours together, and at other times as much upwards, whilst the rise and fall by the shore were at the usual periods. These anomalies were probably occasioned by the wind, and seemed not to extend far below the surface; for I found a counter-current at the bottom."

SECTION IV.

CHAPTER XXXVI.

THE WINDS OF THE PACIFIC OCEAN.

THIS important branch of the navigation of the Pacific is not so clearly understood, or its particulars so well defined, as they are in other parts of the world, where science or commerce have attracted a greater number of voyagers, and elicited a far greater extent of observation. In this, as in other points connected with the great ocean, its vast extent operates against the attainment of that minute acquaintance with its phenomena which is so readily attainable in the Atlantic or Indian oceans. The brief remarks, therefore, which we have to present on this point must be taken rather as generalities derived from the observed facts, or often deduced empirically, than the assertion of any certain laws by which these phenomena are governed. A general law cannot be established by a single observation, which is frequently the amount of our knowledge; and it is therefore evident that, before any system can be absolutely established, these observations must be greatly multiplied and amply discussed.

The wind-systems of the Pacific appear to be more simple than those of the Atlantic or Indian oceans. In them local causes—the configuration and effect of the land in modifying their natural characteristics—have much greater influence than in the Pacific, where the land and water exist in a very different ratio to each other.

Of the natural causes which produce those mighty currents of air, known as the trade-winds, and the less regular extra-tropical winds, much need not be said here. The explanation first given by Dr. Halley is that now considered as the correct one. After he had promulgated his theory he rejected it, and it was not acknowledged until it was revived by John Hadley.

The inter-tropical zone is maintained at a much higher temperature than those to the North and South of it, from the sun being constantly vertical over some portion. The air within that space becoming rarified, and thus specifically higher than that outside the limits, rises from the surface, while the colder air replaces it by flowing over the surface of the earth from the poles toward the equator. The warmer air must, according to this theory, be carried over these southerly and northerly currents in an opposite direction, and thus, by keeping the equilibrium, maintains a continuous circulation.

In the revolution of the earth on its axis, the equatorial portions moving with so much greater velocity than those in higher latitudes, it necessarily follows that the aerial currents flowing towards the equator must acquire increased velocity in order to keep up with this greater velocity, and so, having less speed than that of the new surface over which they are brought, these northerly and southerly currents must drag upon it in an opposite direction to that of the earth's rotation, or from East to West; thus from simple northerly and southerly winds they become permanent *north-easterly* and *south-easterly* winds. If the earth did not diurnally revolve on its axis, and the equatorial portion were maintained at the same high temperature, these would be simply northerly and southerly winds on the surface of the earth, while the upper strata of the atmosphere would move in an opposite direction.

The constant friction of the earth upon air near the equator, it may be objected, would tend to neutralize the rotation of the entire mass; but it is compensated in this manner. The heated equatorial air rising, and flowing off towards the poles, carries with it a rotary velocity much greater than that of the surface over which it passes to the northward and southward. Hence it will gain more and more on the surface and assume more and more a *westerly* relative direction; and when at length it returns to the surface in its circulation, which it necessarily must do more or less in all parts of its course, it will act on it by its friction as a powerful S.W. wind in the northern, and a N.W. wind in the southern hemisphere, and thus restore the equilibrium.

Continuing what has been said above respecting the southerly and northerly currents which approach the equator, it is manifest that as they reach a lower latitude the difference in their initial velocity and that of the earth's surface decreases, and for several degrees on either side of the equator cannot perceptibly vary. Their easterly character must, therefore, tend to diminish, and at the equator must lose it altogether. And more than this: these southerly and northerly currents thus meeting and opposing, will mutually destroy each other, leaving a space of variable breadth between the two zones, in which their characteristics are not well marked, when calms and rains prevail. Thus we have in the inter-tropical regions two great belts of wind—from the N.E. in the northern hemisphere, and from the S.E. in the southern hemisphere, commonly known as the N.E. and S.E. trades, separated by a belt of variable and light winds, affected only by local causes, whose breadth and latitude are affected by the annual progress of the sun in the ecliptic.

Such, then, would be the arrangement of the moving mass of the atmosphere on the surface of the earth, if it were of a uniform character, or without the variations of land and ocean. But as these two conditions are very differently acted on by the external agents of heat, magnetism, and other physical causes, very different results are found to occur in the vicinity of either than what is seen when each has the entire action on the atmosphere. Thus on the sea-coast in the warmer latitudes the same phenomena as that causing the trade-winds is found to occur in the succession of land and sea-breezes. During the day the sun's action causes the surface of the land to be warmer than that of the ocean, as water is much less absorbent of caloric; the rarified air ascends, and the cooler air from the sea

rushes in to replace it, and thus forms the sea-breeze. The reverse takes place during the night. Then the surface of the sea is frequently warmer than that of the land, and the air rushes towards the sea and causes the land-breeze.

These well-known phenomena demonstrate that the winds in the vicinity of land do not follow the same regularity that they do in the open ocean, where their difference of condition is not in operation. Hence the remarks which are applicable to any one latitude are of a very different nature according as they are intended for the vicinity of land or the reverse.

Even small areas of land have a very marked effect on the regularity of the trade winds. The aggregation of minute spots in the coral groups, as in the Low Archipelago or the Caroline Islands, are sufficient, apparently, not only to intercept their regular course, but even to reverse it, as the winds, even in hurricanes and strong gales, frequently blow in opposition, and this not only in a partial manner, but for considerable periods, and over a very great extent. How it is that the land should have such apparently undue influence, or whether it is that the area of one zone of winds sometimes usurps the situation of another (as was supposed by Capt. Cook), are questions yet to be solved.

In a subsequent page we shall speak of those combinations of opposing winds, now known as revolving storms, which are met with in considerable violence in some parts, especially the western regions of the Pacific; our present attention being confined to the winds as they are usually found.

In applying these principles to observed facts in the Pacific, we are under the disadvantage of having so (comparatively) few connected and authentic records of careful observations. Under these circumstances there is a degree of temerity in entering upon the consideration without so far extending the subject as to make it beyond the limits of the present work, already too large. We shall therefore confine the observations to those which are the result of the experience of those navigators whose judgment and observation deserve every confidence.

At the head of those who have hitherto treated on the winds of the Pacific stands the eminent Admiral Krusenstern. Although his work, written a quarter of a century since, may not embody all that can be drawn up on the general subject, yet it presents the combined observations that existed at that period. In justice to that great man we therefore give his remarks on the winds as he has written them.

ADMIRAL KRUSENSTERN ON WINDS.

I have not yet met with a work which contains a complete treatise upon the prevailing winds and currents* of the Pacific Ocean, similar to those which D'Après de Manneville, Dalrymple, and Horsburgh have published on the different portions of the East Indies: and because a perfect acquaintance with the winds and currents in the different seas is of very great importance to navigation, particularly upon their coasts, where they often take directions altogether opposite to those which are found in the open ocean, I have thought it not out of place to add an essay which should contain some general notions on these subjects for the

* It may be observed that we have here separated the remarks on the *currents* from those on the *winds*; in the original they are given together.

different parts of this sea. It is true that the celebrated Dampier* has left us a treatise, which is still at the present day of the greatest utility to mariners; but his navigation, whether in the eastern or the western portion of this ocean, was not extended towards the North. There is also the work of Romme on the winds and tides, doubtless a most estimable work, but which must rather be regarded as a general treatise on winds and tides, rather than a manual for the different parts of the South Seas.

A large portion of the ideas which I give in this essay are the results of my own experience, collected during a sojourn of two years in parts which are seldom or never visited; but these notions form so small a portion of the whole mass of knowledge requisite to form a complete treatise upon a subject so interesting for navigation in general, that I have conceived it a duty to add to it all that I have found important upon the subject in the different works of the more celebrated navigators who have traversed this ocean at different seasons. Notwithstanding this, I feel that the little treatise which I here offer to the public is but a very imperfect, incomplete sketch, which I shall endeavour to improve and complete.

The prevailing winds in the Pacific Ocean, as in all other great seas, with the exception of the Indian Ocean, are divided into regular or trade-winds and variables. These generally blow from N.W. and S.W. from 30° of latitude to the poles. The former are found between the tropics, and often reach as far as 30° of latitude, and are distinguished from the regular trade-winds of other parts of the globe in that they are more permanent and blow fresher. Near to the coasts which surround the Pacific Ocean the winds at the same time vary from the ordinary rule, and obey the same laws to which the monsoons of the Indian Ocean are subjected by the influence of the lands; it is principally upon these winds that I here propose to speak in detail.†

WESTERN COASTS OF THE PACIFIC OCEAN.

BEHRING'S STRAIT.

Capt. Cook, King, and Kotzebue met most frequently with northerly and southerly winds in Behring's Strait; that is to say, in the direction of the strait, which generally is the case when both shores of a strait are bounded by high lands.

To the South of Behring's Strait, along the coast of Kamtschatka, the Kurile Isles, the Islands of Jesso and Japan, the winds are subject to the same irregularities as in all other high latitudes.

COAST OF KAMTSCHATKA.

According to Romme, easterly and south-easterly winds prevail on the coasts of Kamtschatka from the month of June to that of August; but nevertheless I felt the contrary in the years 1804 and 1805, having then been as well at Kamtschatka

* A Discourse on Winds, Breezes, Storms, Tides, and Currents, in the second volume of his Voyage.

† I have already mentioned the intelligent Dampier; I am gratified also to name the observations published on the dominant winds in the western part of the Pacific by my friend Horsburgh; and also the notices of M. de Humboldt on the winds which prevail on the S.W. coast of America, in his excellent work on New Spain.—*Krusenstern*.

as on its coasts from June to the middle of September ; the prevailing winds were then S.W. and West. The only days when we had winds fresh from S.E. were the 5th and 6th of July, and the 20th and 30th of September. Neither do we see by the journals of La Pérouse that the winds from S.E. prevail at this season. Capt. Rikord states that in autumn the gales generally come from N.W. ; and cites several instances of vessels which have been detained whole weeks before the Bay of Avatscha before they were able to enter : the ship *Mary*, of the American company, was a whole month in sight of the coasts of Kamtschatka, the wind from North and N.W. not allowing her to enter the port. [^]The currents met with in Behring's Strait, running to North and N.W., sufficiently demonstrate that the S.W. winds are those which occur most frequently in summer on the coasts and in the Sea of Kamtschatka ; and although winds from S.E. may be felt, these are nevertheless not the prevalent winds. >

KURILE ISLANDS.

During summer the winds are variable near the Kurile Islands, and it is then difficult to determine which are the prevalent quarters. Capt. Golownin, who was charged in 1811 to trace the geography of these islands, remarks that with winds from the S.S.E. and S.S.W. quarters the weather is always foggy, but the haze being dry, the sun is often visible through this fog. Winds from the East and N.E. bring rain and bad weather. With winds from N.N.E. and N.N.W. the weather clears up, and the temperature is cold. We had, in the *Naditjeda*, May 31, 1805, a very strong gale from N.N.E., accompanied with snow, the mercury of the thermometer falling $1\frac{1}{2}^{\circ}$ below zero. The temperature with winds from N.N.W. to W.S.W. is cold, and the air dry and hazy. With winds from S.S.W. to W.S.W. the sky is clear, and sometimes, though rarely, it is foggy, and the temperature very warm.*

EASTERN COAST OF JAPAN.

Capt. King, as well as ourselves, in the *Naditjeda*, ran along the eastern coast of Japan during the months of September and October. In this part of the year, at least, the winds are variable, although they blow oftener from the northern quarters than from the South, and principally under the parallel of the northern part of the Japanese coast.

EASTERN COAST OF CHINA.

The winds which blow along the N.E. and North coasts of China are generally called Monsoons. The name here has nothing to do with the matter : it is only necessary to remark that these winds, as well by their constancy as their direction, differ greatly from the monsoons which are met with in the China Sea. In this the N.E. monsoon ends towards the month of April, and that of the S.E. commences, although along the East and N.E. coasts of China the N.E. winds continue to blow until the month of June : it may be affirmed, that during nine or ten months of the year, that North and N.E. winds blow along the eastern coast of

* Voyage of Capt. Golownin.

China, and if at times it turns to the South, these cases are rare and of short duration, the wind always reverting to the N.E. Not only are the winds prevalent along the coast of China, but also upon that of Corea, throughout the Sea of Japan,* and also, perhaps, in all the Gulf of Tartary. It is thus that Pérouse, for example, met with constant North winds, when in 1787, in the months of April and May, he went across it from Manila toward the northward, and it was not until lat. 37° that the winds were found from the southern quarter. In the *Nadifjeda*, the North winds did not leave us in the month of August until the latitude of 40° . On the western coast of Jesso, the winds which we found prevalent were those of N.W. and S.W.; but Broughton, who was here in the month of August and during the middle of September, found the winds constant from East and N.E.

It appears, according to the observations made by Capt. Broughton on the prevalent winds from the Strait of Formosa as far as the Madjicosima Isles, where he lost his vessel in the month of May, that they blow, nearly without interruption, from the northern quarter, although in the month of July they blow from the South as far as the southern of the Japanese Islands. Capt. Basil Hall did not find, in the same month, but winds from the S.W., as well on the S.E. coast as on the East and N.E. coast of China, but the North and East winds become established from the month of August in the Yellow Sea, and at the commencement of September on the western coast of Corea, and near the isles to the S.W. of Japan, with such strength and constancy, that Capt. Hall, finding himself in lat. 30° N., lon. 128° E., inserted in his journal, September 12, "the wind has altogether the character of a monsoon."

There are no exceptions to general laws met with in the N.W. part of the Pacific Ocean; between Behring's Strait and that of Formosa, as, for example, in the Sea of Kamtschatka, the Gulf of Tartary, the Sea of Japan, and the Sea of Okhotsk.†

GULF OF TARTARY.

Two navigators only have been in this gulf as far as the junction of the Peninsula of Saghalin with Tartary, the opposite continent: these are La Pérouse and Broughton. The first in the middle of July, 1787, and the second in September, 1797. La Pérouse met with constant southerly winds, and Broughton with those from the eastern quarter, and often from the N.E. From this we may conclude that, near the coasts of China, Corea, and as far as the extremity of the Gulf of Tartary, the above-mentioned laws are applicable, and that southerly winds only blow during two or three months in the year.

SEA OF SAGHALIN.

We sailed in this sea in the *Nadifjeda* from June until August. The winds were variable, as well from the South as from the North; and the currents were subject to the same uncertainty.

* Under the title of the Sea of Japan I comprehend the sea which washes on the western shore of Japan and the Isle of Jesso, as far as the Strait of La Pérouse.

† Fleurieu would have this called the Sea of Lama; it would be, perhaps, more reasonable to name it the Sea of Saghalin, because this peninsula, which is 200 leagues in length, forms the whole of its western portion.

We were not a long time in the Sea of Okhotsk ; that is to say, in the northern part of the Sea of Saghalin ; and even in this short time it was rarely possible to get observations in consequence of the continual fogs which characterize this sea, and in which we were constantly enveloped. But it is to my friend, Capt. Minitzkoy, a distinguished naval officer, that I am indebted for the following ideas on the winds and currents of this sea. They are the result of observations made during a residence of eight years at Okhotsk, where he was commander-in-chief, and where he profited by the opportunities to collect all that could contribute to extend knowledge among our profession.

During the months of June, July, and August, the winds generally blow from S.E. and East, very rarely from any other quarter ; they are moderate, and generally accompanied by fogs and rains. In September, towards the close of the day, the wind passes gradually to the South by the West and N.W., and is, in the night, tolerably fresh from the N.W. Towards 10^h A.M., it sinks, and then veers to the South. During all these months the sky is serene, and the winds moderate.

From the middle of October to the beginning of December, violent storms and gales of wind occur ; fine weather generally returns as soon as the wind passes to the North and N.W.

In the months of December, January, February, and March, the winds constantly blow from North and N.E., with a clear sky.

In April and May the winds are moderate, blowing from the North during the night, and from the South in the day.

The currents follow the direction of the coast.

It would seem, from this view, that easterly winds prevail throughout the year, and that westerly winds, which are so frequent in high latitudes, occur but very rarely here.

YELLOW SEA.

The vessels in which Lord Macartney and Lord Amherst proceeded as ambassadors to China, are the only Europeans which have traversed the Yellow Sea ; both were in it in the months of July and August. With few exceptions, the winds blew constantly between South and East, in such a manner that I believe it may be affirmed that, during these two months at least, the S.E. monsoon prevails in the Yellow Sea. But Captain Hall found, in the month of September, in the eastern part of this sea, that northerly winds occur, which perfectly agrees with what I have said before, that it may be taken as a general rule, that the S.W. monsoon does not blow but during two, or at most three, months of the year, within the N.W. limits of the Pacific Ocean ; that is to say, from the North extreme of the Gulf of Tartary toward the S.E. extremity of China, which is the Strait of Formosa ; but during these three months it does not always blow from S.W., but often from S.E.

COAST OF THE PHILIPPINES AND THE NORTH COAST OF NEW GUINEA.

The rule concerning the winds from the North and South, and their unequal duration, cannot be applied to the sea lying to the South of the Strait of Formosa,

and along the eastern shores of the Philippine Islands, the Island of Magindanao, and the coast of New Guinea; the S.W. and the N.E. monsoons here change every six months. Capt. Hunter, for example, found, near the eastern coast of the Philippine Islands, the S.W. monsoon in all its force in the month of July; it blew from W.S.W., West, and W.N.W., with a current to the southward from lat. $12^{\circ} 25' S.$, and lon. $128^{\circ} 30'$; to the southern extreme of Magindanao its velocity was from 30 to 50 miles in twenty-four hours. In the same neighbourhood Capt. Carteret experienced, on the 20th of October, a violent storm, which he took for the shifting of the monsoon. There is, then, no doubt that the monsoons regularly change; but N.E. winds are not exclusively prevalent during the N.E. monsoon, for during one-half the season the winds blow from the North. This is what the Marquis de Ponterat, a French officer who sailed for several years in these parts, says:—"At the northern portion of the eastern side of the Isle of Luzon, northerly winds blow at times with much violence, particularly from the beginning of December until the middle of February, and are accompanied with rainy weather, with squalls, the horizon overcast in every quarter, and the coasts become so enveloped in fog that they must be approached very closely to make them out, which renders this description of wind very dangerous to approach or make the land in this part of the isle." Thus it is much better not to approach the land in this season but with much precaution, and to bear off from it on the first appearance of bad weather. In the month of February the northerly winds commonly disappear, and give place to breezes, generally very fresh, from East or N.E., which blow usually until the end of March. The weather is constantly fine, and the serenity is scarcely ever troubled.

According to the same authority, the S.W. monsoon is still less constant than the N.E. monsoon:—"In the Strait of San Bernardino, and particularly on the eastern coast of the Isle of Luzon, the winds during the S.W. monsoon keep more commonly between the South and N.W., and are always interrupted by breezes from the N.E. and S.E. quarter. These latter are more common the farther you get from the Isle of Luzon, and the nearer you approach the Mariannes. Around the Isle of Luzon there are met with, from time to time, gales of wind known in the country under the name of *colla*. They commonly last seven or eight days, but are sometimes prolonged to fifteen. They generally commence with much rain and wind, and always finish by considerable storms, accompanied by thunder and great deluges of rain; the wind then blows with force from the S.W. to the N.W. quarter, and it often does so with great violence; they oftenest begin to blow at the time of the full moon, and they always do so at the commencement of one of its phases. These sorts of winds extend their effects to a great distance; they are felt as far as the Mariannes, and it is thus but seldom that in this way the effects of the S.W. monsoon are extended."*

It will not be out of place here to say a word upon the typhoons, which occur so frequently in the western parts of the Pacific Ocean, where they blow with still greater force than in the China Sea.† It is generally reckoned that the

* Journal d'un Voyage, par M. le Marquis de Ponterat, p. 133.

† This subject will be alluded to presently; but, in order to preserve the order of these remarks, it is here added.

meridian of the Mariannes, in lon. 145° , forms the limit of these typhoons; but I believe, nevertheless, that they do not extend so far off, and that they are rarely met with to the East of the Palaos Islands. It is also said that they are more violent according as they take place in a higher latitude; this is true. Towards the North they extend as far as the coast of Japan, as I proved in 1804; towards the South their limits are 8° or 9° of latitude. They commonly take place about the periods of the changing of the monsoons, that is to say, in the months of May, June, October, and November; but sometimes earlier, as, for example, in 1797, when the Spanish squadron, under the orders of Admiral Alava, encountered in the China Sea, the 25th April, a terrible typhoon, which dismasted all the ships of the squadron, and destroyed a frigate.*

Although a typhoon is ordinarily announced by many indications, there are not any certain means of foreseeing them in such a way as to provide in time against their effects, excepting the fall of the mercury in the barometric column; and there is no doubt but that since the extensive use of this instrument, there are many less vessels fall victims to storms. Capt. Horsburgh, when in the China Sea in 1804, was premonished by a considerable fall in the barometer of the approach of a violent storm; having had the time to prepare for it, he was happily able to bear up against the rage of a horrible tempest which soon followed, while a Portuguese vessel, not having the means of such salutary advice, did not take the same precautions, and went to the bottom. I will here name my own experience. On October 1st, 1804, I steered with a favourable wind towards the coast of Japan, which we had perceived at daybreak, and from which we could not be far distant; I hoped at the same time to be able to reach before sunset the Strait of Van Diemen, when, at 10^{h} A.M., a rapid descent of the mercury in the barometer warned me not only not to approach the land, but, on the contrary, to make all sail off from it, and to seek safety in the open sea from a sudden storm. I began to prepare myself, by every means, to face it. At 3^{h} P.M., the typhoon burst, and, after shattering our lower sails to ribbons, it drove the ship towards the land, from which, happily, we had been distant more than 7 leagues since 10^{h} . Without the prognostication of the barometer, our ship would have been infallibly wrecked on the coast. Every sailor will easily conceive how very important it is to prepare against a threatening storm; thus, for example, if the anchor, which was made ready for casting, and the cable had not been fresh clinched (a precaution which I certainly should have neglected without the well-timed advice given by the barometer), the typhoon would, beyond doubt, have destroyed the ship.

The monsoons also prevail between the Isle of Magindanao and New Guinea, and extend as far as the meridian of 145° East. Surville, in his track from West toward the East, carried the S.W. monsoon as far as the equator, which he crossed September 28th, on the meridian of 148° East. Capt. Hunter, in his passage from New Holland to Batavia, lost the trade-wind in lon. 144° , where he crossed the equator. The winds were variable as far as lat. 4° N., where the S.W. monsoon commenced under the meridian of 140° , accompanied by a

* Voyage du Marquis de Ponteraj, pp. 135-6.

westerly current so violent, that his ship was carried 220 leagues toward the East, between June 19th and July 12th.*

As the coasts of the Admiralty Isles lie to the South of the equator, they are subject to the same laws which obtain in general in the Indian Seas, that is to say, that when the S.W. monsoon blows to the North of the equator, it blows from the S.E. to the South of the equator, and when it blows from N.W. here, it blows from N.E. to the North of the equator. D'Entrecasteaux, for example, met with, near to the Admiralty Islands, a fresh wind from S.E., with a strong current from the East, in the month of July; but in approaching the equator this wind sunk and became variable, and he had frequent dead calms.

SALOMON ISLANDS.

Experience has proved to many navigators, as Carteret, Surville, Maurelle, Shortland, and D'Entrecasteaux, that in the vicinity of the Salomon Islands the winds ought rather to be considered as monsoons than as trade-winds, although it is very difficult to distinguish the S.E. monsoon from the trade-winds of this sea.

Capt. Carteret met with, in the month of August, during his traverse of the Isles of Santa Cruz and New Ireland, a fresh breeze from S.E., accompanied by a strong current towards the West and S.W. Admiral D'Entrecasteaux, on the contrary, during the season of the S.E. trade-winds, that is, in the months of May and June, even to the South of this archipelago met with winds from West, with a strong current bearing to the East; but the situation of these islands, intersected by straits and channels in different directions, must destroy the regularity of the winds and currents. It appears by the journal of Surville, that to the North of the Salomon Islands the winds blow in the months of September and October from S.E., E.S.E., and E.N.E., though feebly, accompanied by a strong current, bearing to the South; during the nine days he remained at Port Praslin, the winds were from N.E. and East, then E.S.E., and again North; but in general they were weak and variable; at other times he had dead calms. Surville quitted the Salomon Islands, November 9th, and arrived, December 16th, at New Zealand; and as the S.E. monsoon had already passed, and the season of the northerly winds had commenced, we must attribute the prevailing S.E. winds which he met with, not to the monsoon, but to the S.E. trades. Maurelle, on the other hand, only found in these same parts to the South of the equator but steady winds from North, that is, the monsoon. Shortland passed the Salomon Islands in August, and encountered a constant S.E. wind.

EASTERN COAST OF AUSTRALIA.

It now remains to speak upon the prevailing winds along the coast of New South Wales. The S.E. and N.W. monsoons succeed each other, but, during the period of that from the S.E., there are also those from East and N.E. From Torres Strait to the tropic the winds blow from S.E., commencing from the month of May until September; this is probably the S.E. monsoon; Flinders calls it

* Although this is not exactly expressed in the journal of Hunter, I have, notwithstanding, calculated the force of the currents as well by the text as by the tables of his track.

the trade-wind. Although he had not learned by his own experience from what quarter the winds blew from November until April, he supposed that it was from N.W., because he found them in all their strength in the month of November. During this period the weather is fine, while the N.W. monsoon is always accompanied with bad weather.

From the tropic of Cancer to Bass's Strait the wind blows, according to Flinders, from October to April from the S.E. quarter, with fine weather; he calls it the trade-wind.

In winter, from the month of May until September, S.W. and westerly winds prevail.

In Bass's Strait the most frequent winds are the S.W. and West. Flinders says that N.E. winds are not met with except in the months of January, February, and March, with clear weather; but their lasting cannot be depended on.

On the eastern coast of Van Diemen's Land, nearly the same winds are met with as to the North of Cape Howe.

EASTERN PART OF THE PACIFIC OCEAN.

I have remarked at the commencement of this memoir, that in Behring's Strait the winds generally blow in the direction of the strait, whether to the North or South; that Capt. Cook did not observe any current, but, on the contrary, that MM. Kotzebue and Wassilieff here found a current running to the N.E. Besides this, Cook speaks of a current running to the N.W.; he found it to the South of Behring's Strait, between Norton Sound and Cape Prince of Wales, particularly near this cape, and within the island, which he named Sledge Island.

Near the Aleutian Islands, and particularly in the straits which divide them, the currents are always violent.

Along the N.W. coast of America, the currents in the offing run to the North, and take their direction from that of the coast. Respecting the winds near the land we may divide them into four zones, each of which will present different directions for the winds.

The *first* zone commences at Behring's Strait, and extends to lat. 30° N.

The *second* zone from lat. 30° to 5° N.

The *third* from lat. 5° North to 30° S.

The *fourth* from lat. 30° to Cape Horn.

In the regions of the *first* zone the winds blow in all seasons in every direction, although Humboldt* supposes that between Behring's Strait and the 5th degree of North latitude there prevails North and South monsoons, that is to say, from the month of May to that of October winds from S.S.W. and S.E. are met with, and from November to April those from North and N.E. It does not seem, however, by the voyages of Cook, Vancouver, and other navigators who have frequented the N.W. coast of America, that these winds succeed each other regularly; and if sometimes winds blow oftener from South during summer, and from North during winter, I do not think from this that we can establish a general rule; for S.E. winds are also very frequent in winter, and it is with a violent S.E. wind that winter sets in. We find, also, the opposite to the rule, and that

* Essai, &c., sur Nouvelle Espagne, tome iv. p. 392.

only N.W. winds blow during summer. It is certain that the S.E. winds, whether those blowing in summer or in winter, are always accompanied by bad weather, by fogs and rain; and, on the contrary, the N.W. wind is accompanied by dry weather, and oftenest with cold weather.

I will adduce some examples, taken from the journals of the more celebrated navigators who have visited the N.W. coasts of America, to show that the winds have here too little regularity in their direction, to give them, as Humboldt does, the name of monsoons.

Cook, while on the coast of America in the month of March, in lat. 44°, had constant and very fresh breezes from N.W., which accompanied him during his navigation towards the North until the beginning of summer; he met with, it is true, from time to time, gales from the S.E., but they were but sudden shifts, and did not commonly last more than six hours, after which the wind reverted with great force to the N.W., and it was only by means of these short breezes from the S.E. that Cook could work his way to the North. It is seen equally by the voyages of Pérouse, and Portlock, and Dixon, that southerly winds do not predominate during the summer months.

Although Vancouver, when surveying the coast of America in the middle of April, 1792, that is, towards the end of the northerly monsoon, experienced violent gales from S.E. and E.S.E., with continued rains, and, although up to 50° of latitude the winds blew continually from the southern quarter, yet, when he came on to the coast, in the ensuing year, following it upon the same parallel and in the same season, that is, mid-April, he met with fresh northerly winds as far as his arrival in Nootka Sound. It is true that, in the month of September, in the same year, he met with some breezes from S.E. to S.W., but he also had them from N.W. In the month of December, 1792, on the contrary, being under the parallel of Port San Diego, in lat. 32° 42' N., the winds blew constantly from the South.* These accompanied them to the parallel of 30°, although they ought to have blown from the North if these winds change regularly. Thus it is winds from the northward, and particularly from the N.W., which blow the most frequently, and occasion, as Vancouver says, a great hindrance to any advance to the northward; the Spaniards, consequently, in general keep a long way off the coast, running much to the northward of the parallel of their intended destination, to arrive at it more readily. Vancouver believes that they push this precaution too far; he is of opinion that, by the aid of the land-breezes from East and S.E., the duration of which is longer, and which have also greater force than the sea-breezes, any port may be attained. This opinion of Vancouver is correct, at least for the navigation from the Bay of San Francisco, in lat. 30° to Concepcion Point, in 34½°, and even farther North.

Near to the Bay of Kenay (or Cook's Inlet), Kodiack Island, and Prince William's Sound, Vancouver found, in March and April, most frequently winds from N.W. and North. In May, June, July, and August, 1794, the winds often blew from S.E. and East, with great force, but not less frequently than from N.W. and S.W. Although Capt. Meares had a very strong wind from S.W.

* Vancouver's Voyage, vol. i. pp. 194, 203; and vol. ii. pp. 406, 412, 480, 490.

under the parallel of 50° , and that during the months of June and July the winds come more frequently from South than from North, he says, nevertheless, page 234 of his Voyage, that during the summer months westerly winds prevail as far as 30° of latitude, with as much regularity as easterly winds prevail from 30° to the equator. I ought here to add, that, according to these observations of Vancouver, the weather is generally bad to the North of Cape Mendocino, in lat. 40° N., and that to the southward of this the winds are moderate and the weather fine.* Experience has, however, shown the contrary; and to me it seems certain that, to the South of Cape Mendocino, at least during winter, the southerly winds are always moderate.

I am indebted to Capt. Hagemester, of our marine, for some notice on the predominant winds and currents in this part of the globe, and which he had collected during a navigation of several years on the N.W. coast of America. These notices merit the greatest confidence, being the result of a great number of observations made with the most scrupulous exactness, particularly at New Archangel in Norfolk Bay, and at Port Ross (Port Bodega), on the coast of New California; both lie within the limits which I have given to this first zone. It results from these observations, as well as from those already cited, that northerly winds are not the exclusive attribute of winter, as those of the South are not of summer, but the contrary frequently takes place.

By the observations made at New Archangel in lat. $57^{\circ} 2' N.$, it seems that it is easterly winds, accompanied with rain and snow, that are predominant in winter. At the beginning of December there are frequent squalls and tempests, which do not occur in summer, and towards the end of this month the Aurores Boreales are very strong. About Cape Chirikoff, in lat. $56^{\circ} 9'$, the currents have a constant North direction, and often with a velocity of 2 miles an hour. The direction of the current along this coast is in general towards the North; near to Port St. Francis it takes a West direction, toward Prince William's Sound and the entrance to Cook's Inlet, after which it turns toward the South, along the coasts of Kodiack. The remains of vessels shipwrecked on the American coast are often found about the southern part of the Island of Kodiack; among them those of Japanese vessels, which are recognised by the camphor-wood of which they are built.

N.W. winds are predominant during summer on the Californian coast; and about the former Russian establishment, Port Ross, in lat. $38^{\circ} 40' N.$, they blow almost uninterruptedly until the month of October, and are consequently opposed to those which it was believed to have been prevalent here. In the month of November the wind becomes established in the S.W. and S.E., with deluges of rain, and if they pass to the N.W. the sky becomes serene. In October a wind from the N.E. sometimes blows, which is so hot, that it would seem to come from a heated oven; it does not last long, but it occasions catarrhs, coughs, and pleurisies. In December and January the mountains become covered with snow, but for a few hours only. In the months of March and April the winds are variable; in summer, as in winter, thick fogs are frequent.†

* Vancouver, vol. II. p. 329.

† MS. of Capt. Hagemester.

SECOND ZONE.—FROM LATITUDE 30° TO 5° N.

We may conclude, I think, from what has been before said, that, from Behring's Strait to the latitude of 30° North, the northerly and southerly winds do not succeed each other regularly, and consequently that these winds are not subject to the same fixed law as the monsoons. More to the southward this is not the case, and especially between 30° North and 30° South latitude; but it is necessary to remark, that within these limits, although the prevailing winds in it have the character of trade-winds, they have not the same direction throughout, and that they are regulated according to the direction of the coasts; for example, upon the coasts of Peru and Chili, the direction of which is nearly North and South, the dominant winds are those from the South; they are as permanent as the trade-winds between the tropics. On the coasts of New Spain, on the contrary, which have a direction more to the West, the winds also follow this deviation. The point at which the coast commences to take a southerly direction is the southern point of the Gulf of Panamá, and it is this point which may be looked at as the limit between the prevailing winds on the coasts of Chili and Peru and those of New Spain, in such a manner that the second zone extends from the 30th to the 5th degree of North latitude.

There is still another difference between the winds on the coast of Peru and those on the coasts of New Spain. The first are, as I have above stated, trade-winds, while the latter may be termed monsoons; that is to say, that from November till April, the N.W. and N.E. winds are dominant, and from May till October, those from South, or from S.W. and S.E.; but still there are exceptions in the uniformity of these winds, in such a manner that if we give the name of monsoons to them, they are not to be compared for regularity with the monsoons of the Indian Ocean and the China Sea. But it is only near the coast of America that these monsoons and trade-winds are found; the first extend 40 or 50 leagues from land, while the trade-winds extend to a greater distance from the coast.

According to Dampier, winds from the West are always met with near the coasts of New Spain between lat. 10° and 20° ; but there are, nevertheless, exceptions to this rule, for Capt. Vancouver, in making his way to the South from Monterey, in December and January, found only winds from N.W. and N.E. as far as Cocos Isle, in lat. 5° N.

The S.S.W. and S.S.E. winds, which blow from the months of May until October, and which the Spaniards term *Bendevales*, are accompanied with heavy rains and tornadoes, or with calms, which often last for several consecutive days, with continued thunder and lightning. There are also instances of the rain having continued for twenty-five days at one time. Gales of wind commonly occur from the S.W. in the months of July, August, September, and October; they are called *Tapayaguas* on the coasts of Niagara and Guatemala, and it is very difficult in this season to enter into any of the ports lying on the shores of New Spain, as *San Blas*, *Acapulco*, *Realejo*, *Sonzonate*, and *Tehuantepec*; the Spaniards never enter the ports of San Blas and Acapulco before the month of November, and only after the stormy season has passed; Capt. Colnett even supposes that fine weather cannot be reckoned on before the month of January.

I have already said that during the winter months the winds from N.E. and N.W. prevail between 5° and 30° of North latitude ; but they are not in general accompanied with fine weather, as in high latitudes. The winds from the northern quarter become settled usually in the month of November ; Capt. Colnett, nevertheless, encountered those from N.N.E. and N.N.W. towards the end of September and beginning of October, under the parallel of 20° or 23° , and the nearer he approached the land, the more the wind drew towards the West. He had continued rains and tempests near Capes San Lucas and Corrientes, and this weather did not change until November.

Near Acapulco the winds blow from the western quarter during winter, usually very fresh from N.W. ; vessels which come from the South take great care to make the land to the South of Acapulco, for fear of not being able to gain this port because of the violent N.W. winds ; for this reason they run as far as the parallel of 20° before they get out of the N.E. trade-wind. Arrived at this parallel, they bear for Acapulco, where they have then a favourable wind.* The only favourable chance that a vessel has to reach Acapulco, after having fallen to the southward of it, is the land-breezes, which blow, though but feebly, during the night, until eight or nine o'clock in the morning, from the East and E.N.E.

From November until April the weather is fine on the coast of New Spain ; the Spaniards call this season *Verana de la Mer del Sur* ; but during this period violent N.N.E. and N.E. winds, with a clear sky, are often felt ; these winds are called *Papagayos* and *Tehuantepec*. According to M. de Humboldt, they not only extend from lat. 5° to 30° , but from the mouth of the Gulf of California to the Bay of Panamá, that is, from lat. 22° to 70° N. It is between the Gulfs of Nicoya and Santa Catharine, or between lat. $9^{\circ} 30'$ and $10^{\circ} 45'$, that they blow strongest. Dampier gives a different description of these Papagayos winds. He assigns to them nearly the same limits—from Cape Blanco, in lat. $9^{\circ} 56'$, to Realejo, in lat. 11° ; but he adds that during the months of May, June, and July, they blow from the North for three or four days at a time, and frequently for a week together, night and day, as he himself experienced in 1685. We learn still further, that winds from the eastern quarter prevail in the Gulf of Panamá from September until March ; the rest of the year they blow from South to S.S.W.

Between lat. $13^{\circ} 30'$ and 15° , from 70 to 100 leagues from land, calms are met with in the months of February and March, which frequently last for a long time, and which are compared by M. de Humboldt to the calms in the Gulf of Guinea. He cites the example of the crew of a vessel who, after having been becalmed for twenty-six days, were obliged to take to their boats to reach the land, though they were 80 leagues distant from it.

From the coasts of California and Cinaloa to Acapulco and the Gulf of Tehuantepec, situated in lat. 16° , and 5° to the East of Acapulco, the current runs to the S.E. from the month of December till April, and to the W.N.W. and N.W. from May till December. A ship which has not the means of determining

* The first land which the Spaniards endeavour to make is the *Farallones de Sigüenza*, lying 40 leagues to the N.N.W. of Acapulco, a little to the West of Cape Petatlan.—*Humboldt, Essai sur Nouvelle Espagne*, tome iv.

her longitude by astronomic observations, may reckon with great confidence that when the latitude observed is found to be North of the reckoning, then her true longitude will be more westerly than the reckoning; and when the latitude observed is more southerly than the latitude according to the ship's reckoning, then the true longitude ought to be also to the East of the reckoning. Southward of latitude 16° this rule is no longer applicable.

THIRD ZONE.—FROM LATITUDE 5° N. TO 30° S.

The coasts of Chile and Peru are not subject to tornadoes, nor to violent winds, as are the coasts of New Spain. It has been already observed that the winds here follow the direction of the coast, ordinarily they blow between S.S.W. and S.S.E. According to Dampier, they extend to 500 miles in the offing. Farther off the winds take a more easterly direction, and at 200 leagues from the coast the E.S.E. trades are met with: with these constant southerly winds it is easy to make the route towards the North; the only things to fear are the calms, which are found under the equinoctial line. As the winds blow continually from the South, the currents ought to bear to the North, and facilitate the passage when arrived at the calms; but this is not the case, for they bear to the South, as has been remarked by Capt. Colnett. Between Cape St. Helena (the northern extremity of the Gulf of Guayaquil, in lat. $4^{\circ} 20'$ S.) and the Galapagos Isles he was carried into a stream of current which reached as far as the view extended, and which was about a mile in breadth: his ship was carried towards S.W. $\frac{1}{2}$ W., at a rate of $2\frac{1}{2}$ miles an hour. Capt. Colnett also noticed a strong current which came out of the Gulf of Guayaquil, with a velocity of 40 miles in twenty-four hours. Vancouver also observed a current bearing towards the West, near the Galapagos Isles: but in general here, when the direction of the currents is not altered from particular causes, they always bear to N.W. and W.N.W. Near to Cape Blanco (the southern extremity of the Gulf of Guayaquil) Dampier had to contend a current which bore to the N.W. with such force that he found it impossible to overcome it. The ships which came to Acapulco in order to reach Lima made away towards the South as far as lat. 20° and 30° , and often to the parallel of the Island of Juan Fernandez, to avoid the currents and southerly winds; they did not make for the land until they could attain the place of their destination by the aid of the S.E. trade-winds. The Spaniards called this navigation *por altura*, a voyage which usually occupied three months: there are instances, however, as M. de Humboldt says, of vessels having been seven months making this passage. Although it seems that, with the aid of the land-breezes, the passage may be made along the coast from North to South, nevertheless, as these breezes are very weak near the different capes, and calms are met with near those which are most projecting, it appears that it is nearly impossible. Capt. Funnel even avers that from Cape Passao, in $0^{\circ} 8' S.$, to Cape Blanco, the land-breezes do not occur; but this has not hitherto been verified. Dampier says that the Spanish vessels, which proceeded from the North to South, after ranging the coast up to Cape Blanco, here quitted it to find the trade-winds in the offing, on account of the violent currents which absolutely hindered them from doubling it. M. de Humboldt tells us that the Spanish vessels often made their track along the coast in sailing from

North to South ; but only from the Gulf of Guayaquil to Lima, because in this space the land-breezes blow during eighteen hours, and the sea-breezes for only six hours, in such a way that they proceeded to the S.S.W. with the land-breeze, and neared the land again with the sea-breeze ; but they ought not to go farther off shore than 60 or 70 leagues. This navigation, called by the Spaniards *Navigacion por el Meridian*, had the great advantages that they then avoided the gales which often occurred during the months of August, September, October, and November, between lat. 28° and 33° .* Capt. Colnett, who ranged along this same portion of coast, at the distance of only a few leagues, does not mention this singularity in the duration of the sea and land-breezes ; he only remarks that the currents on it are very irregular.

In the months of November, December, and January, you are exposed to storms, rains, and winds near the Galapagos Isles, and there is fine weather during May, June, July, and August.

FOURTH ZONE.—FROM LATITUDE 30° TO CAPE HORN.

The southern trade-wind, after having blown from lat. 5° N. near the American coast, terminates near the coast of Chili, when the North and South monsoons recommence : besides this, it is difficult to determine the point which limits the trade-winds and the monsoons. Funnel says† that the South winds commence in lat. $38^{\circ} 30'$, near the Isle La Mouche ; but it seems to me that this is placing it too far to the South, and that we may prefer the supposition of Humboldt, who assigns the 30th degree of latitude for their limits. According to Frezier,‡ the winds from North and N.W. blow during two or three months of the year near Coquimbo in lat. 30° , near Valparaiso in lat. 33° ; they blow during four months, that is, from May until December, accompanied with rain and fogs, but they are not very violent : the remainder of the year the weather is dry ; the winds from South are predominant, and blow with such violence that vessels are often driven from their anchors in the road of Valparaiso.

Capt. Vancouver, in his track towards the South, encountered, in the month of May, winds from N.W., with bad weather. Near Concepcion Bay, in lat. 36° , and the Isles of Chiloe, in lat. 42° S., the North and South monsoons last longer. As we approach Cape Horn, the prevalent winds are, with few exceptions, those from S.W. and N.W. ; in winter they blow with peculiar violence. The currents follow the direction of the winds, and near to Cape Horn they will always be found bearing to the East.

This concludes Admiral Krusenstern's remarks, which, though in many respects are brief, must be taken as the sum of the then available information. Nor is there even now anything which will subvert the statements here set forth ; and it only remains to add to these the observations which have been made on the portions of the Pacific not fully touched on, that is, in the eastern portions on the American coasts.

* Humboldt, *Essai Politique sur Nouvelle Espagne*, tome iv. p. 403.

† Dampier's *Voyages*, vol. iv. p. 116.

‡ *Tableau des Vents et des Courants*, par Romme.

WINDS OFF CAPE HORN, ETC.

In an early page of this work (part i. pp. 40, 41) we have given Capt. P. P. King's remarks on this head. By referring to this it will be seen that westerly winds prevail during the greater portion of the year; the East wind occurring in the winter months, and but seldom in the summer. They invariably rise light with fine weather, increase gradually, and sometimes end in a heavy gale, but more frequently do not rise to this strength.

North winds are generally accompanied by thick weather and rain; they always commence moderately, but increasing in strength, they draw to the westward, blowing hardest between North and N.W., the strength of which lasts from twelve to fifty hours, and sometimes shift suddenly into the S.W. quarter, blowing harder than before.

Winds from the S.W. generally last several days, blowing strong, moderating towards the end. Northerly winds then again commence, and thus constant shifts from North to South round the West are felt during the summer.

Bad weather never comes on *suddenly* from the East, nor does a S.W. or southerly gale shift quickly to the northward. South and S.W. gales rise suddenly and violently, and should be well considered in choosing an anchorage.

This is the sum of the information contained in the passages quoted. But little more need be said here. The constant prevalence of winds between S.W. and N.W. renders the passage round Cape Horn from the Atlantic frequently one of difficulty and hard work. April, May, and June, are perhaps the best months for making the westerly passage. The summer months are preferable for the other direction, but this is so easy as scarcely to require much consideration.

WESTERN COAST OF PATAGONIA.

As in the preceding paragraphs, we refer to a former page (part i. p. 69) for some remarks on the winds in this portion. They prevail from the N.W. If it blows hard from that quarter, it is very liable to shift round suddenly and blow heavily from the westward. These do not usually last long. If they veer round to southward, should the barometer rise, it will clear up; should they tack round to N.W. again, and the barometer keep low or oscillate, the weather will doubtless become worse. Easterly winds rarely occur, and bring fine clear weather. Westerly winds, on the contrary, bring constant rain and a quick succession of hard squalls of wind and hail.

The barometer rises with southerly winds, the maximum being with S.E. winds; it falls with northerly and westerly winds, the minimum being at N.W.

M. Lartigue makes the following remarks on the Patagonian winds:—

The winds blow strongly from N.W. to S.W. for about ten months of the year on all the extent of the West coast of America comprised between Cape Horn and the 40th degree of latitude. S.W. winds shift at times to S.S.E.; but those from N.W. come rarely to N.N.E. If the weather should become overcast during calms, which are generally of short duration in these parts, the first breeze which springs up generally comes from North or N.N.E.: it freshens gradually; rain begins to fall; and the weather becomes hazy, principally near the land, where

sometimes the fog will not allow objects to be seen at 2 miles' distance. The wind continues to acquire strength; and as it freshens it passes round to N.N.W. and N.W.; then the rain diminishes, and the sky begins to get clearer. When the wind gets to N.W. it usually flies quickly to W.S.W., in gusts which are sometimes very violent; other gusts succeed rapidly, and it is then that the wind is strongest. At all times when these W.S.W. winds, that come in gusts have lasted a certain time, they end by coming round to S.W., and the weather then gets finer: afterwards, though rarely, they pass to S.S.W. and even S.S.E. These latter extreme variations occur particularly near the land and to the S.W. of Cape Horn, where the winds generally preserve the same direction for a longer time than they do to the West of the American continent.

When the N.W. winds have shifted during a gust to W.S.W., if they diminish in strength instead of increasing, as we have before said they will return to the N.W., and pass successively to West and W.N.W. The N.W. winds do not always shift at once to W.S.W.; but they change, sometimes in summer, and very often in winter, by passing successively to W.N.W. and West: they are then accompanied by rain, but soon changing again to N.W., blow successively in the same intermediate directions.

Winds from W.S.W. to S.S.E. are the only ones which last for any length of time: all those which blow in any other direction are constantly changing. It is but rarely that S.E. to N.E. winds are felt on this coast; but when they do blow from this quarter, they are almost always violent, and last but a short time. They are generally announced by short intervals of calm, which follow strong W.N.W. winds which have passed in succession to the West, and have been accompanied, as well as the calm, by very abundant rain. The winds from S.E. to N.E., after having blown during some hours, revert to N.N.E., losing their strength, and then get to the North; having got to this quarter, they acquire strength, and are not long before they again pass to the N.W.

When the winds come from the land, the number of inlets and islands existing between the Strait of Magalhaens and the Island of Chiloe have necessarily an influence on their direction. In reality, these winds must come from the interior of these bays and channels, and blow in their direction: thus Dampier says that he sailed up this coast with easterly winds, by keeping within sight of land.

But when the winds come from N.W. to S.W., and blow right on shore, they are so strong, that neither the neighbourhood of the land, nor its direction, can make the least alteration; it is then dangerous to approach the coast, particularly in winter.

From the month of October until that of April, that is to say, during summer, the winds from W.S.W. are most frequent; in winter those from N.W. to W.S.W. are so, and these, as has been before stated, are very variable. It blows hard almost always in these parts, particularly in winter. The sea is very heavy also in this season of the year; and it is also impossible to make head against a contrary wind without great strain upon the ship.

The winds from S.W. to N.W. being of less strength, and the sea not so heavy in high latitudes as upon the corresponding parallels on the American coast, it will be prudent, at all times when the wind comes from the western quarter, to run

up to at least the parallel of 60° , and there need be no fear of passing beyond this parallel so long as the wind keeps to the North of West. But if it gets to the South of this bearing, you can then take a N.W. course. It is a general rule that you ought to get to the West, and at as great a distance from the land as possible before closing with the land and bearing up to the northward: for, in winter especially, you must endeavour to avoid being obliged to keep too close, and even to run 2 or 3 points free, in case the wind should get to the North of West, and approach to N.W.

The difficulties that are met with in getting to westward after having doubled Cape Horn to bear up again along the western coast of America, going from South to North, arise from the strength of the adverse currents which are experienced there, and the heavy sea which they occasion. On the contrary, it is very easy to get to westward on leaving the coast of Peru to go into the Atlantic Ocean: everything seems to favour this passage. You will go, by the assistance of the usual winds, to a good distance from the land, and thus avoid all contrarieties in case the wind should get to the South of West.

CHILOE AND THE CHONOS ARCHIPELAGO.*

There is much less difference between the climate, the prevailing winds, and the order in which they follow, the tides, and the currents on the outer coast of Chiloe and at the West entrance of the Strait of Magalhaens, including the intermediate coasts, than persons would suppose who judge only by their geographical positions. North-westerly winds prevail, bringing clouds and rain in abundance. South-westerly winds succeed them, and partially clear the sky with their fury; then the wind moderates, and hauls into the S.E. quarter, where, after a short interval of fine weather, it dies away. Light airs spring up from the N.E., freshening as they veer round to the North, and augment the store of moisture which they always bring; from the North they soon shift to the usual quarter, N.W.; and between that point and S.W. they shift and back sometimes for weeks before they take another round turn. When the wind backs (from S.W. to W.N.W., &c.) bad weather and strong winds are sure to follow. On that coast the wind never backs suddenly, but it shifts with the sun (with respect to that hemisphere) very quickly, sometimes flying from N.W. to S.W. or South in a most violent squall. Before a shift of this kind there is almost always an opening or light appearance in the clouds towards the S.W., which the Spaniards call an eye (*ojo*), and for that signal the seaman ought to watch carefully. As the sudden shifts are always with the sun, no man ought to be taken aback unexpectedly; for, so long as a north-wester is blowing with any strength, accompanied by rain, so long must he recollect that the wind may fly round to the S.W. quarter at any minute. It never blows hard from East, rarely with any strength from N.E.; but an occasional severe gale from S.E. may be expected, especially about the middle of winter (June, July, August). In the summer southerly winds last longer and blow more frequently than they do in winter, and the reverse. The winds never go completely round the circle; they die away as they approach East; and after

* FitzRoy, Appendix, No. 10, p. 163.

an interval of calm, more or less in duration, spring up gradually between N.E. by E. and North. Heavy tempests sometimes blow from W.N.W. to S.W. ; and those winds, blowing directly on shore, are most to be guarded against.

COAST OF CHILE.

The following observations are also by Capt. FitzRoy :—

From September to May is the fine season, during which the skies of Chile are generally clear, and, comparatively speaking, but little rain falls. It is not, however, meant that there are not occasional exceptions to the general case : strong northers have been known (though rarely) in summer ; and two or three days of heavy rain, even with little intermission, now and then disturb the equanimity of those who have made arrangements with implicit confidence in the serenity of a summer sky. These unwelcome interruptions are more rare, and of less consequence, to the northward of 31° than South of that parallel : and indeed so nearly uniform is the climate of Coquimbo, that the city is called La Serena.

In settled weather a fresh southerly wind springs up a little before noon (an hour sooner or later) and blows till about sunset, occasionally till midnight. This wind is sometimes quite furious in the height of summer, so very strong that ships are often prevented from working into their anchorages, such as Valparaiso Bay, although they may have taken the precautions of sending down topgallant-yards, striking topgallant-masts, and close-reefing their sails. But the usual strength of this sea-breeze (as it is called, though it blows along the land) is such as a good ship would carry double-reefed topsails to it when working to windward.

This is also nearly the average strength of a southerly wind in the open sea, between the parallels above mentioned ; but there it is neither so strong by day, nor does it die away at night. Within sight of the land a ship finds the wind freshen and decrease nearly as much as in the ports, where the nights are generally calm till a land-breeze from the eastward springs up ; but this light message from the Cordillera is never troublesome, neither does it last many hours. With these winds the sky is almost always clear ; indeed, when the sky becomes cloudy, in summer, it is a sure sign of little or no sea-breeze, and probably a fall of rain : in the winter, it foretells an approaching northerly wind with rain.

In summer, ships anchor close to the land, to avoid being driven out to sea by those strong southerly winds ; but as the winter approaches a more roomy berth is advisable, though not too far out, because near the shore there is always an undertow, and the wind is less powerful. Seamen should bear in mind that the course of the winds on this coast, as in all the southern hemisphere, is from the North round by the West ; that the winds which blow the hardest, and bring the most sea, come from the westward of North ; and that therefore they should get as much as possible under the shelter of rocks or land lying to the westward, rather than of those which only defend them from North winds. Northers, as they are called, give good warning ; an overcast sky, little or no wind unless easterly, a swell from the northward, water higher than usual, distant land remarkably visible, being raised by refraction, and a falling barometer, are their sure indications. All northers, however, are not gales ; some years pass without one that can be so termed, though few years pass in succession without ships

being driven ashore on Valparaiso beach. Thunder and lightning are rare. Wind of any disagreeable strength from the East is unknown. West winds are only felt while a norther is shifting round, previous to the sky clearing and the wind moderating. The violence of southerly winds lasts but a few hours; and even a northerly gale seldom continues beyond a day and a night, generally not so long.

Some persons say that the strength of northerly winds is not felt to the northward of Coquimbo, but there is good evidence of many gales with heavy seas at Copiapó; and Capt. Eden states that he had a very heavy gale of wind in H.M.S. *Conway*, in lat. 25° S., lon. 90° W., where such an interruption to the usual southerly winds was little to be expected.

Observations by M. Lartigue.—There are but two seasons to be distinguished on the coast of Chili; the summer, which lasts from the month of October to that of April; and the winter, which is also called the rainy season, which lasts from April until October.

The winds which prevail in summer blow from S.W. to S.S.W.; they approximate to the South, and are more frequent and less strong according as you advance to the northward. These winds are felt in this season up to the 27th degree of latitude, where the general winds are usually met with. The *Clorinde* found, during summer, at a great distance from the land, light winds from South to S.W., and nearer the coast they were rather fresh: lastly, between Juan Fernandez and Valparaiso, she had winds very fresh from South to S.S.W.

Winds from the North are less frequent and less strong the nearer you approach the tropic; they are sometimes violent, even in summer, at Valdivia; but at Valparaiso they were found to be very moderate. They are rarely felt in a lower latitude than this port.

The winds from the North to W.S.W. are, in winter, the most frequent, and are generally found up to the 27th degree of latitude; and sometimes they are even met with at Lima, which is in lat. 12° S.

At Valdivia the rainy season begins in April; and it becomes later as you advance to the northward. It is not before the end of May that they become frequent at Valparaiso.

In addition to these remarks, all that has been said on the changes which occur in the wind between lat. 40° and Cape Horn is also applicable to this part of the coast: here E.S.E. to N.E. winds are rarely met with. When it blows from North to West much rain falls, but as soon as it is between W.S.W. and S.E. the weather is very fine.

In winter prevalent winds are not found in lat. 21° ; between this parallel and that of 27° light and very variable winds are found to prevail.

COAST OF PERU.

The prevailing winds on the shores of Peru blow from S.S.E. to S.W.; seldom stronger than a fresh breeze, and often, in certain parts of the coast, scarcely sufficient to enable shipping to make a passage from one port to another. This is especially the case in the district between Cobija and Callao.

Sometimes during the summer, for three or four successive days, there is not a breath of wind ; the sky beautifully clear, and with a nearly vertical sun.

On the days that the sea-breeze sets in, it generally commences about ten in the morning ; then light and variable, but gradually increasing till one or two in the afternoon. From that time a steady breeze prevails till near sunset, when it begins to die away ; and soon after the sun is down there is a calm. About eight or nine in the evening light winds come off the land, and continue till sunrise ; when it again becomes calm until the sea-breeze sets in as before.

During winter (from April to August), light northerly winds may be frequently expected, accompanied by thick fogs, or dark, lowering weather ; but this seldom occurs in the summer months, although even then the tops of the hills are frequently enveloped in mist.

To the northward of Callao the winds are more to be depended on ; the sea-breeze sets in with greater regularity, and fresher than on the southern parts ; and near the limit of the Peruvian territory (about Payta and off Cape Blanco), a double-reefed topsail breeze is not uncommon.

It is to be remarked, that, although such moderate winds are the general rule on the coast of Peru, yet that sudden and heavy gusts often come over high land after the sea-breeze sets in, and, from the smallness of the ports, are attended with some inconvenience, if precautions are not taken in duly shortening sail previous to entering them.

The only difference between winter and summer, as far as regards the winds, is the frequency of light northerly airs during the former months ; but in the weather the difference is far greater than one would imagine in so low a latitude. In the summer the weather is delightfully fine, with the thermometer (Fahrenheit) seldom above 70°, and often as high as 80°, in a vessel's cabin ; but during winter the air is raw and damp, with thick fogs, and a cloudy, overcast sky. Cloth clothing is then necessary for the security of health ; whereas in summer, the lighter one is clad the more conducive to comfort and health.

Observations by M. Lartigue.—There are but two seasons on the coast of Peru : summer, from October to April ; and winter, which lasts from April till October.

The wind is tolerably fresh in summer ; the sky is clear, but it is overcast the moment that the breeze comes off the land, or if it has been calm throughout the day, then the lightest sea-breeze dissipates the vapours. In winter the breezes are commonly light ; sometimes calms are met with, which in the neighbourhood of Arica last for two or three days, but they are of less duration as you proceed to the North or South of that place.

In this season the weather is always cloudy during the night and in the morning ; when the sea-breeze is at all fresh it clears up, but it again becomes dull as soon as this breeze diminishes in strength.

In approaching Arica during winter, the horizon is very often seen excessively charged with very black clouds, which form a dark band, which sometimes attains a considerable breadth ; it is a sign that the breeze in the offing is light ; but, as soon as it begins, the horizon clears up directly.

There is constantly, in winter, a very strong swell from S.W. to S.S.W. ;

then it is very difficult to communicate with the land. The coast is straight, and generally very steep, offering but few landing places for boats, or places where they can be sheltered from the sea, which would otherwise dash them against the rocky shores or on the sandy beaches, and infallibly cause their destruction.

The swell is very much less in summer, and communication is more easy. But little of it is felt at 4 or 5 leagues from land; it is near the land that it is so strong.

It never rains on the coast of Peru; but there is sometimes, during part of the night and morning, fogs or dews, which are perhaps more effective than light rains.

Dampier says, in his *Voyages*:—"Rain never falls on the West coast of Peru; the height of the Andes, perhaps, may be the cause: it is likely that the great mass of water falls principally upon the eastern side of these mountains, without reaching their tops, and in the case when it does arrive at this point, perhaps it is arrested by them and dissipated there, and does not extend farther off."

The rivers increase in magnitude in the summer, and overrun their banks often in February and March; they are low during winter, and are nearly dry in August and September.

Summer and winter the heat is moderate near the coast, whether at sea or on the land, the thermometer never having risen higher than 82° (Fabr.) during the stay of the *Clorinde* on the Peruvian coast. The nights here are generally cool.

The winds are generally light on all the extent of coast comprehended between the Morro Mexillones and Lima. They blow almost entirely from the southern quarter, but varying according to the direction of the coast, with which they ordinarily make an angle towards the sea of about 22°. In the portions where the coast runs N.W. and S.E., the winds blow from S.S.E., and when it runs North and South, they blow from S.S.W.

The breezes are more fresh and more regular when the coast runs North and South. At Arica, as also to the South of this town, when the coast runs North and South, the breeze is ordinarily brisk in the afternoon, and rarely fails.

Almost always it is calm throughout the night and in the morning; but at times, though rarely, a land-breeze is experienced.

The sea-breeze is not generally felt till the afternoon; the later it rises the more weak it will be found; and at the same time it comes more from seaward. It then will soon drop.

On the contrary, the earlier it arises the stronger and more lasting it becomes; then it follows the direction of the coast, and sometimes even blows from the land; but it is never more inclined than two points with the direction of the shore.

It has been remarked, that at a little distance behind the projecting points, where the winds ought to be the weakest, they are, on the contrary, found to be stronger than in the portion where the coast is straight. The more these points advance the fresher the wind is, but they always preserve the same inclination with the general direction of the coast.

Behind the points of Ilo, Ilay, and Cornejo, the S.S.E. breeze is fresh in the afternoon, but towards the wind and in the offing, it has not more strength than on the other parts of the coast. It is the same at 3 or 4 miles to windward of the same points.

The Bay of Lima is closed to the South and West by the low point of Callao and the high Island of San Lorenzo; the breeze here is fresher, and the calms less frequent, than in the anchorages lying more to the South.

The winds from South to E.S.E., though blowing with more uniformity than those of which we have been speaking, are felt in the offing, and at a distance which is subject to variation. On the parallel of Arica they sometimes are not found but at 30 or 40 leagues; but as you proceed northward, they are met with successively at a less distance from the coast. On the parallel of Lima they are found at less than 10 or 12 leagues from land; when you get to the South of Arica they blow at a distance from the coast, which is as much less as you get farther off from this port, with this difference, that, according as you approach the line of the variable winds, these winds are not so regular as to the North of Arica.

The wind gets stronger as you get farther off the land. It will then be perceived that the sea-breezes last longer, and that the direction of the coast lying on the parallel of the station, loses its influence on the direction of the wind, which then has greater strength during the night than during the day. This distance is probably subject to variation, nearly in the same proportion as the band of variable winds which is along the coast; for this distance, which is the greatest on the parallel of Arica, diminishes like the breadth of the band of variable winds according as you advance to the North or South of this port. It seems, nevertheless, that the chain of high mountains which exist throughout the whole length of Peru intercept the general winds, and exercise their influence at a much greater distance from the land; for it is not but at about 140 leagues off, that the general winds are met with, the direction of which are constant, and their strength uniform. The winds which blow within this limit, from S. to E.S.E., are very variable in form and in direction.

Dampier, otherwise so exact an observer, in his treatise on the winds which prevail on the surface of the globe, in speaking of those which are felt on the coast of Peru, has neglected to distinguish between the narrow band where the land and sea-breezes are weak and blow in a direction which depends on that of the coast, with the band much farther off, where the winds are very variable from South or E.S.E., and acquire considerable strength. He seems to have confounded them when he says, "The S.S.W. and S.S.E. winds which blow on the coast of Peru are strong, and extend farther out than any of the very variable winds which are found under the shelter of the continent;" and he adds, "The general winds from E.S.E. do not blow but at from 140 to 150 leagues from land." If, instead of speaking in this passage of the S.S.W. to S.S.E. winds, we substitute winds from South to E.S.E., &c., all that is said will apply rigorously to the band of great breadth which is outside that where the land and sea-breezes take place, and of which the outer limit is much nearer the coast.

However, it is not to be wondered at that this navigator, so remarkable for

his sagacity and the correctness of his judgment, has omitted some details in his very short treatise, where he proposes to speak of the winds, breezes, tempests, tides, and currents, which are found in all the parts lying between the tropics.

The result of our own experience bears out the facts that we have stated respecting the light winds which occur near the land, and different degrees of force which they successively have according as you get farther off the land. During a navigation of ten months on these coasts, every time that the *Clorinde* sailed a short distance along the land, she never made more than 15 leagues in twenty-four hours, and sometimes she has even made less than 5. The greatest distance she run, by keeping at 30 leagues off the land, was 50 leagues, with a very fine sea: some Peruvians, who were passengers with us, told us then that it was a storm for that country, so little were they accustomed to experience winds at all fresh.

It seems the light land-breezes and those from the sea are not felt from Lima to Guayaquil, at a greater distance from the land than at Lima itself. The *Clorinde* did not navigate in these parts; but many captains of vessels, who have frequently made the voyage from one of these places to the other, told us that, from the coast to the distance of 10 or 12 leagues off, the winds were the same as about Lima; and beyond that, they found fresh breezes, but variable, from S. to S.E., which extended, as in all parts of the coast, to a great distance in the offing.

Other commanders who have frequented these seas, and the inhabitants of the country, assured us, that in winter North and West winds are sometimes felt, but that they are generally light, and do not last long. It appears that these winds blow, in this season, to a considerable distance from land; for several vessels going from Valparaiso to Lima in winter have been baffled by short breezes from North to N.W., and by calms, although they were 80 leagues from the coasts of Peru. Dampier states that these coasts are exempt from westerly winds; but our experience proved the contrary, and confirmed what was advanced by the inhabitants of the country. In July, 1822, being in lat. 17° S., at 30 leagues from land, we had light winds from North to W.N.W., which lasted two days; and when we were anchored at Callao, at the end of May, 1823, we had for three days following winds very brisk from W.N.W.

The winds from South to E.S.E. cause, in the offing, currents which run to the N.W.; their greatest velocity was found to be 15 miles in twenty-four hours, and their least rate 9 or 10 miles. Between these currents and the land there is a counter-current, which bears to the S.E., and follows the direction of the land. Its breadth varies very much; sometimes its outer border approaches to 1 or 2 cables' length of the shore, at others it is some miles distant; the fresher the breeze the more this counter-current increases in breadth and velocity.

In winter, when it blows from North to West, the currents bear to S.E.; but it is only near the land that they begin to be sensible.

Although the *Clorinde* almost always sailed before the wind in ranging along these coasts, the winds were so light, and calms so frequent, that it was often difficult to calculate the progress. It is presumable that the unavoidable errors

which are then made in the reckoning have affected the estimated amount that has been made for the velocity of the current.*

The following remarks on the winds to the North of Guayaquil are by Lieutenant-Commander James Wood, R.N., of H.M.S. *Pandora*, engaged on the survey of the Colombian coast. They will command implicit confidence, and are given in the Nautical Magazine for September, 1850.

The prevailing winds of the Pacific, with the exception of those on the coasts of Chili and Peru, are little known. A few remarks, therefore, on those that obtain along the western coast of America from the river Guayaquil to Vancouver Island, as well as on the more regular and extended aerial currents which traverse the vast expanse of the open ocean, condensed from observations and information collected during a four years' cruise over the greater part of it, may not be destitute of interest and utility, especially as the northern portion is but little known, and promises ere long to become the theatre of an important trade between the coasts of China and the new and rich countries which American enterprise and energy are now so rapidly peopling and raising from obscurity on the coast of California.

The whole of this extensive line may be divided into three portions or zones :—

First, the *intertropical*, which is all more or less affected by the fine and rainy seasons.

Secondly, the dry and arid portion, which extends from 23° to 32° N., where the winds blow with almost the regularity of a trade-wind.

Thirdly, the more variable northern coast, which is subject to greater vicissitudes of climate.

GUAYAQUIL RIVER TO GUASCAMES POINT.

The Intertropical.—Along the whole of the coast from the River Guayaquil, in 3° S., to Guascames Point, in 2° N., the wind is mostly from South to West all the year round; the exceptions are few, and generally occur in the fine season. Both in beating up this coast to the southward, and in running down it, the former in the months of May and June, the latter in those of October, November, and January, we had the wind from S.S.E. to West (by the South), with a constant current to the north-eastward, the only difference being that the winds were lighter, and the weather finer in May and June as we got to the southward; whilst the contrary took place in October and November; and in January the weather was generally fine with moderate breezes.

CHOCÓ BAY.

After entering the Bay of Chocó, of which Point Guascames forms the southern horn, the winds become more variable; but during the time we were in the bay (from the end of January to the middle of March) it never blew very fresh, though the weather was often unsettled, and heavy rains frequent. The prevailing wind was from S.W., but north-westerly winds were not uncommon.

* Observations, par M. Lartigue, Lieutenant de Vaisseau, recueillis pendant la Campagne de la *Clorinde*, Commandée par M. le Baron Mackau, 1842-43.

CHIRAMBIRA POINT TO THE GULF OF SAN MIGUEL.

When past Chirambira Point (the northern horn of Chocó Bay) we had the wind more from the northward, and in the latter end of March had to beat up to Panamá Bay against north-westerly and north-easterly breezes, blowing a fresh breeze at times, especially as we approached the bay.

In surveying this last-named part in January, 1848, we found the winds more variable, heavy rains almost always accompanying a change to S.W., from which quarter we once or twice had a stiff breeze.

GULF OF SAN MIGUEL TO THE GULF OF DULCE, INCLUDING THE BAY OF PANAMÁ'.

First, or Intertropical Winds.—Between the southern point of the Gulf of San Miguel and the Gulf of Dulce, including Panamá Bay and the coast of Veragua, the winds are regulated by the seasons. Towards the end of December the northers begin to blow. These are fine, dry breezes, which generally come on in the afternoon, and blow very fresh from N.N.E. to N.N.W. till near midnight, with a perfectly clear and cloudless sky, and the air so dry and rarified that objects on a level with the horizon are distorted and flattened, and the same effects are caused as are seen during an easterly breeze off our own coast. Though generally a double-reefed topsail breeze, they occasionally blow much harder, especially off the coast of Veragua, where, in the months of January and February, even a close-reefed topsail breeze is not uncommon. During even the strongest of these, a dead calm often prevails 10 or 15 miles off the land, the only evidence of the gale that is blowing within a few hundred yards of you being the agitation of the water, which is raised into short hollow waves, which break on board and tumble you about awfully.

Towards the end of March up to the middle of April, the northers begin to cease, and are succeeded by calms and light sea and land-breezes, with occasional squalls from the south-westward. As April advances the squalls get stronger and more frequent, and by the early part of May the rainy season generally sets in, during the greater part of which South and south-westerly winds prevail: these are not very violent within the Bay of Panamá; but from Punta Mala westward, gales from the above quarters are frequent, and sometimes severe, bringing a very heavy sea with them.

GULF OF DULCE TO THE GULF OF FONSECA.

From the Gulf of Dulce, proceeding westward along the shores of Costa Rica, Guatemala, and Mexico, we find the winds still follow the changes of the seasons, modified, however, by locality. For instance, whenever the northers prevail, we find them blowing off the shore at nearly right angles to the run of the coast; thus, as soon as the coast of Nicaragua is approached (which takes a more northerly direction than that before mentioned) we find during the fine season the northers exchanged for breezes called Papagayos. These blow from N.N.E. to E.N.E. or East, and are accompanied by the same clear fine weather as the northers; the prevailing wind, however, during this season (from January to April) is from S.E. to N.E. From May to November, which is the rainy season, the weather is mostly

bad, gales from the West and S.W., with thunder, lightning, &c., being frequent, and at times violent.

GULF OF FONSECA TO THE GULF OF TEHUANTEPEC.

After passing the Gulf of Fonseca, where the land again trends nearly due West, the northerly winds are lost, till on reaching the Gulf of Tehuantepec we meet them once more, but under a different name, and assuming a more violent character. Along this portion where the mountains approach, and even in some places form the coast line, the winds during the fine season are the usual tropical land and sea-breezes; the former from N.W., the latter from South to W.S.W. and West. The remaining months are marked by even worse weather from the same quarters as is found on the Nicaragua coast.

FROM THE GULF OF TEHUANTEPEC TO TEXUPAN POINT.

First, or Intertropical Winds.—The heavy blasts which blow over the isthmus of Tehuantepec derive their source from the country they cross. They seem to be caused by the northers in the Gulf of Mexico, which here find a vent through the opening formed between the Mexican and Guatemalian mountains. They blow with great force from North to N.N.E., and raise a very high short sea; their force is felt several hundred miles off the coast. During the season when they prevail (December to April) every preparation should be made to meet and carry sail through them: if this can be done they are soon crossed, and 200 to 250 miles of westing (or easting) made; otherwise, if you are obliged to heave-to, 36 to 118 hours of heavy weather may be expected, exposed all the while to a very high and short sea. In the rainy season these cease; but the weather here, as along the whole coast of Mexico, is then very bad, gales and strong breezes from S.E. to S.W. constantly occur, whilst squalls, accompanied by thunder and lightning, with heavy and almost incessant rain, characterize the season throughout. These gales are at times very severe, rendering the navigation of such a coast very unpleasant, as, with one exception, there is scarcely any shelter from them to be found. During the fine season, however, nothing can be more regular or quiet than the weather on the Mexican coast; a regular sea-breeze sets in about noon, beginning from S.S.W. to W.S.W., and getting more westerly as the sun goes down, decreasing with it, and gradually sinking into a calm as the night closes in. This is succeeded by the land-wind off the shore, which is more irregular in its direction and force; but these winds, and the method of making a passage to the westward along the coast, have been so well and so truly described by Dampier and Basil Hall, that nothing remains but to add my testimony to the correctness of the accounts they give as far as their phenomena fell under my own observation.

As soon as the coast begins to trend northerly again, which it does about Texupan Point, we meet the northerly winds which blow down the Gulf of California, and which are found pretty steady during the fine season a few miles off the coast: by taking advantage of these, and the daily variations caused by the land and sea-breezes, the passage is made from this point to San Blas and Mazatlan; but it is always a tedious beat, owing to a contrary current and frequent calms.

FROM CAPE ST. LUCAS TO SAN DIEGO.

Second Portion or Division.—From Cape St. Lucas to San Diego, or from 23° to 32° N., the general direction of the wind is from West to North, but during the winter months, or from November to April, this coast is subject to violent gales from the S.E., which, as most of the bays and anchorages are open towards that quarter, are much dreaded. This is especially the case along the northern portion of this division, as towards Cape St. Lucas they are less frequent: however, they always give ample warning of their approach. The only way, therefore, of making a passage up this coast is by standing off upon the starboard tack: as you get out the wind draws to the eastward, till either the variables are reached, or you can fetch your port on the other tack. In the summer season the only alteration is that the wind is more westerly in the mornings, and draws round with the sun as the day advances.

FROM SAN DIEGO TO SAN FRANCISCO.

Third Division.—From San Diego to San Francisco the wind prevails from the north-westward nearly all the year round.* This coast is subject to the same south-easterly gales as the coast of Lower California, but they are more frequent here, and blow with greater force. All its bays and roadsteads are similarly exposed, with the exception of the above-named ports, which are perfectly secure, and defended from all winds. During the winter, therefore, vessels always anchor in a convenient berth for slipping, with springs and buoys on their cables, so that on the first appearance of heavy clouds approaching from the S.E., with a swell rolling up from the same quarter (the invariable signs of the coming gale), they may be able to slip and go to sea without loss of time. These gales last from twelve hours to two days, and are accompanied by heavy rain, which lasts till the wind changes, which it often does very suddenly, and blows as hard for a few hours from the N.W., when the clouds clear off and fine weather again succeeds. Off Concepcion Point gales and strong breezes are so frequent as to obtain for it the appellation of the Cape Horn of California. They are mostly from North to West, and frequently blow with great force, especially in the winter, when they sometimes last for three days together, without a cloud to be seen, till they begin to moderate. But here one of the most remarkable features of this coast first shows itself, viz., the frequent and dense fogs, which, during more than half the year render the navigation from San Diego northward most unpleasant. In making the land, the only way to deal with them is to feel your way into the coast with the lead during the day-time, as it frequently happens that a thick fog prevails at sea, while at the same time, within a mile or two of the land, a clear, bright sky, and open horizon are to be found: if disappointed in this you have but to wear, haul off again, and heave-to till the desired change does take place.

* In the Gulf of California two winds prevail during the year; the N.W. from October to May, and the S.E. from May until October. During the former season fresh breezes and fine weather will prevail; when the latter brings heavy rains, oppressive heat, and sultry weather. This information was copied by Mr. Jeffery, R.N., from an old Spanish manuscript, and in his visit here in 1834 he proved its correctness.

FROM SAN FRANCISCO TO VANCOUVER ISLAND.

From San Francisco northward to the Juan de Fuca Straits, the north-westerly are still the prevailing winds; in the months of June, September, and October, we found them almost constantly so: hard gales from all points of the compass, however, may be looked for here at all seasons, especially during the winter and the equinoctial months. These begin generally from S.E. to S.W., bringing thick rainy weather with them. After blowing from these quarters for some hours, they fly round to the northward (by the West), with little if any warning, except the increased heaviness of the rain, and blow even harder than before. During the spring, easterly and north-westerly breezes are more prevalent than at any other seasons. In the summer months, westerly winds and fine weather prevail, but from the end of July to the end of August, the fogs are so frequent that many weeks will sometimes pass without a clear day.—(Lieutenant-Commander James Wood, H.M.S. *Pandora*, Nautical Magazine, September 1850, p. 479.)

The region to the North of this has had no very great attention paid to it for a sufficiently long period to gather any just notions of the prevalent winds, or whether any one may be said to prevail. It is more than probable, however, that the usual law holds good here, that of S.W. winds being those most to be expected. We refer the reader to the remarks by Admiral Krusenstern on these points given in a previous page.

The North-East Trade-wind.—The northern limit to this seems to be subject to great irregularity, whether the effect of local causes, or from the undecided nature of the wind itself, does not appear to be well known. Perhaps a more intimate acquaintance, a longer series of observations, might elicit some more decided knowledge than we at present possess. In the early part of this chapter we have given the remarks drawn up by Admiral Krusenstern, from his own observation, combined with those which were at that time attainable. To this we may add a few more and later examples, which will serve to give a clearer notion of its real nature.

The United States' Expedition, in the run from San Francisco to the Sandwich Islands, entered the trades in lat. 26° , being in lon. 134° W. The weather peculiar to them was then experienced, light squalls of rain and a heavy sea following, making the ships very uneasy. This was in October. In the previous June they were found in lat. 24° N., in lon. 170° E., and in the same latitude just to the West of the Sandwich group.

On the other hand, Capt. Beechey found the northern edge in lat. 30° N., lon. 165° E.; this was in June, 1826, so that there is a variation of 6° in the limits found in the same month by Capt. Beechey and Capt. Wilkes.

Capt. Lütke says that the limit of the trade is in lat. 27° 7', lon. 163° E.

These examples are cited as occurring on about mid-ocean, when the influence of the continents must be at the minimum: and even here the fluctuations have

a still wider range, for at the Sandwich Islands, lying between 19° and 23° , during the winter months strong breezes and gales from South and S.W., or in direct opposition to the normal course, are experienced. These are alluded to on page 1124. At other times the usual trades, from N.E. to S.E., prevail.

In the western part of the Pacific the monsoons prevail, and modify or entirely change the character of the trade-winds. On this point some observations will be given presently.

The *southern limit* of the N.E. trade may be looked for from 8° to 10° N., for Lieutenant Ringgold found it in 10° N. in September; and Capt. Wilkes in the same month met with them in 8° N., in the meridian of the Sandwich group. At the same time the northern edge of the S.E. trade was as high as 5° N.

In proof that the latitudes here mentioned may be considered as something near the boundary between the variable and regular winds, we may instance the situation of the Caroline Archipelago, lying between 3° and 8° N., among which the N.E. trade does not always blow, for in September, October, and November, strong westerly gales, with severe squalls and rain, are experienced; and this too in the eastern portion of the range, when the effects of the changing monsoons would be least expected. A reference to the previous remarks on pages 1073 and 1083, will more fully explain this.

The Ladrone Islands seem to be near the eastern limit of the regular trade-winds, and here the fluctuations between their effects and that of the monsoons, may be expected. The westerly monsoon is felt here from the middle of June to the middle of October, veering between N.W. to S.W. by West, and sometimes from South and S.E., but generally between North and West. How far their influence may extend to the eastward of the range does not appear to be well known. During March to June the breeze comes from East and N.E. in the usual manner; the rest of the year the weather is variable.

The South-East Trade-wind.—The southern limit of this is usually considered to be the parallel of 30° S., but it scarcely reaches so far South as this at all times. And from the zone it occupies containing so many groups of islands, which singularly affect its regularity, there cannot be any exactly defined limits applied to it.

There are many singular anomalies observed in its course over the islands, which cannot, perhaps, be well accounted for. At the Marquesas, lat. 10° S., it is tolerably regular. Among the islands of the Low Archipelago, especially from October or November to March, the easterly wind fails, and heavy squalls come from the opposite direction, and this more frequently by night than by day. The natives also say that the severe storms which they encounter come from the N.W. That the south-westerly gales of the higher latitudes also approach the archipelago, is shown by the heavy sea which frequently sets in on the lee side against the regular wind, and thus making it more dangerous to land on those sides than on the others.

Capt. Cook, when at Tahiti, as is noticed on pages 880 and 881, found fresh gales from S.W. for two or three days at a time, and sometimes, though very seldom, from the N.W. When they were variable they were always accompanied by a

swell from the S.W. or W.S.W., which also came in when it was calm. The conclusion he arrived at, most probably the just one as regards the Society Islands, was, that as the trade-wind as found by him does not extend farther to the South than lat. 20° , and beyond that limit he generally found a westerly gale blowing, this westerly wind, when it becomes stronger, will drive back the weaker margin of the easterly wind, and thus encroach on its usual limits (see page 881). At the Samoan group these variations assume the character of the cyclone or revolving storm, and commit great devastation. We shall speak of these presently.

That the parallel of 20° is *about* the southern limit, is apparent at the Tonga group: here the trade-wind is by no means the constant wind, but westerly winds (or "foolish winds," as they are called by the natives) occasionally blow in every season. They are peculiarly prevalent during February, March, and April, often blowing for several days together. The heavy swell from S.W. is also almost continual. This season of variable winds is characterized by the phenomena of hurricanes, as is the case with the Samoan group (see page 809), and Cook's Islands (see pages 802, 803).

At the Feejee group the trade-wind prevails from April till November. From November till April northerly winds are often experienced, and in the months of February and March heavy gales are frequent, assuming the usual character of the revolving storm (see page 915).

When the sun is in South declination, the northern edge of the trades advances to the southward; thus they are interrupted at the Sandwich Islands during the months of January and February, and the S.W. winds usurp their place (p. 1145).

Within the tropics, wherever large groups of islands are found, the trades are subject to great variation, both in direction and force. Also to the northward of the tropic of Cancer, when bound from the Sandwich Islands for the American coast, there are many instances during the spring and summer, of 45° , or even 50° , of North latitude, being reached before a westerly wind could be obtained.

THE WESTERN PART OF THE PACIFIC OCEAN.

This portion of the ocean seems to have a different system of winds from those prevalent to the eastward, from the extension of the monsoons of the Indian and China seas. The following passages, given by an anonymous correspondent to the Nautical Magazine for 1843, seem worthy of great attention; they are therefore given as there found.

Mr. Horsburgh briefly states that the West monsoon, which blows regularly in the Indian Ocean, extends to New Guinea. This monsoon blows as steadily, strongly, and regularly, along the North side of New Guinea, at New Britain, New Ireland, and all contiguous islands South of the Equator, so far eastward as Malanta, and the northern part of the New Hebrides, as in any part of the Indian Ocean whatever; and extending in a wind of gradually decreasing constancy and continuation, from hence far eastward to the Society Islands and Marquesas. The limits in latitude appear similar to the Indian Ocean, from 1° N. to 15° S.; occasionally to 19° S., and the period from the beginning of January until the end of March. Having said thus much, as this is written principally with the

idea of endeavouring to show the practicability of making passages to the eastward in the Pacific (instead of the circuitous route round New Holland), which I have never heard has been attempted by trading vessels, although performed by whalers continually, I proceed to state a few facts of such passages, and will first attempt to prove the practicability of making a passage to the eastward during the easterly monsoon in South latitude, or from April until December or January, by keeping to the northward of the equatorial current, and between the trades or monsoons.

In October, 1835, being off the Asia Islands, and wishing to make a passage to the eastward, winds light and variable, and current running strongly to the westward, against which we could make no progress, stood to the northward, and on the 19th of October were in lat. $2^{\circ} 6' N.$, lon. $134^{\circ} 11' E.$ Having lost the westerly current, pushed to the eastward between the parallels of $2^{\circ} 15'$, and $2^{\circ} 34' N.$ On the 27th were in lon. $147^{\circ} E.$ From hence stood to the south-eastward and made Matthias Island (it being my object to cruise in this neighbourhood); on the 30th passed through St. George's Channel quickly, current favourable, and to the Treasury Islands. Cruised here until 19th of December; started with a westerly wind, which carried us to lon. $169^{\circ} 36' E.$ on the 26th, having passed on the South side of Banks' Islands, becalmed two or three days, then with variable winds, chiefly from E.S.E., proceeded to the southward, and anchored in the Bay of Islands 15th of January.

These passages were made at a season deemed impracticable, before the West monsoon had set in steadily, by a South-seaman of moderate sailing qualities, without using studding sails. The passage to the eastward may, I am convinced, be made at all seasons, by pursuing the same plan, which is, as before stated, to keep to the northward of the equatorial current, and between the trades or monsoons. Here you will have a variable wind chiefly from the westward, with a drain of favourable current at times. Further to corroborate this opinion, June 23rd, in lat. $1^{\circ} S.$, lon. $149^{\circ} E.$, having been drifted from Matthias Island and New Hanover, by a westerly current of $2\frac{1}{2}$ or 3 knots an hour, stood to the northward, got westerly winds on the Equator. With these made easting, and on the 27th reached lat. $0^{\circ} 45' S.$, lon. $155^{\circ} E.$; made Bouka Point soon afterwards; then found a current equal in strength to that at Matthias Island. At this time the westerly current did not extend quite to the Equator.

Again in September, 1840, being unable to hold on near the Admiralty Islands, in consequence of strong westerly currents, stood to the northward, and when in lat. $0^{\circ} 24' N.$, lon. $146^{\circ} E.$, proceeded to $2^{\circ} N.$ before losing the current; then worked to the eastward, and stood to the southward on the East side of the Green Islands, which are in about lon. $156^{\circ} E.$ The passage from Morty to Bouka has also been made in August by adopting the same plan. Although all these passages terminated in the longitude of the Salomon Islands, it was not through inability to proceed farther to the eastward, but merely in consequence of this being the destination. More might be quoted tending to show that these line currents seldom extend northward of $2^{\circ} N.$

During the West monsoon in South latitude, it has been a common practice, for the last fifteen years, for ships to make passages from Timor to the Salomon

Islands, some returning at the commencement of the easterly monsoon, and others spreading over the Pacific. Last year, five ships which had been cruising in the Indian Ocean proceeded eastward between January and April, one along the line to the eastward of the Kingsmill group, another to the Salomon Islands and New Zealand, and the remainder to New Ireland and elsewhere. From all which, I wish it to be inferred, that any ship leaving Manila between the beginning of December and the beginning of March, or any port from which she can reach the North end of the Molucca or Gillolo passages, or Dampier's Strait, between the middle of December and the middle of March, will make a speedy passage to any part of the Pacific Ocean in East longitude; and that during all other seasons the passage is practicable by keeping northward of the equatorial current, and between the monsoon winds.

In the period of the West monsoon, northerly and N.W. winds prevail to the Cape of Good Hope of New Guinea. Passing eastward of this point the westerly wind will generally be experienced fresh and steady, with a current of 2 or 2½ knots, running to the eastward, and extending from the New Guinea shore to about 1° N. A ship may pass near the St. David Islands without risk of losing this wind or current, and northward of Providence Islands. From hence any of the passages may be chosen according to discretion. That by the eastern Dampier Strait, although perhaps the most direct if bound to Sydney, I should not recommend, until the islands northward of New Guinea are more correctly inserted. If St. George's Channel be adopted, it may be preferable to steer along the line until in the longitude of the Admiralty Islands, then pass to the south-eastward between these and Matthias Island, thus avoiding the low islands and reefs to the southward; sail should be carried during the night without fear. Keeping along the equator there cannot be many undiscovered dangers, this track having been a good deal frequented of late years. The other route to the northward of the Salomon Islands, when bound to New Zealand, the Feejee Islands, or anywhere to the eastward, appears to be the best. In the case of New Zealand, the tenth degree of South latitude should not be crossed until reaching lon. 171° or 172° E., then steer to the southward on the West side of the Feejee Islands, passing pretty near, as the easterly winds prevail far to the southward in January, February, and March; but by weathering the reefs near the South end of New Caledonia, a passage may always be effected.

The westerly monsoon in the Pacific, as in the Indian Ocean, is attended with cloudy, overcast weather, squalls, and heavy rains. Some of these squalls are very severe, requiring all sail to be taken in when crossing the wind; even when running, close reefs will be found enough. I have experienced several near New Ireland and New Guinea, which generally gave warning, and commenced at W.S.W., blowing furiously the first hour, and continuing in a strong gale, veering to the N.W. for five or six hours.

From lat. 10° S. to the southern tropic, hurricanes are likely to be experienced from November until April, agreeing also in this respect with the Indian Ocean; and I make no doubt that one of these occasioned the loss of *La Pérouse* and his fellow-voyagers. These scourges of the sea are more prevalent near the New Hebrides and New Caledonia than the Feejee group and Friendly Islands.

In fact, the liability to hurricanes appears in exact ratio to that of the S.W. monsoon, or rather to the meridians in which the westerly monsoon blows, differing in latitude; the monsoon seldom extending beyond lat. 17° or 18° S.; indeed at times 13° S. is the limit, whereas hurricanes are experienced as far as the tropic. From all that I can gather of these hurricanes of the South Pacific, having conversed with several masters who have encountered them, some of whom have had their ships dismasted, I scarcely think they are of that terrific description occasionally experienced elsewhere; and am almost inclined to believe them more often and more severely felt near the islands, than well clear of the land, although aware of this disagreeing with the new theory; but future facts will be necessary to elucidate this subject.

They are still of unfrequent occurrence in the Pacific, several years intervening without any ship encountering one. I possess no facts which would be serviceable in pointing out their track or direction of rotation. They will, without doubt, be considered to agree with other places in the same latitude, yet a few more well authenticated descriptions of these southern hurricanes would not appear to encumber the evidence of their uniformity in these particulars.

Near the Friendly Islands (and perhaps elsewhere) storms occasionally happen of extreme violence, blowing from one point, and producing similar effects to hurricanes. In November, 1835, eight or ten ships, English and American, encountered one of these near Tonga-tabu and Eoa, from S.S.E., the heavy part of which lasted about eight hours, causing more or less damage to all; one or two were dismasted. It was described by the masters whom I saw, which included most of them, as being more severe than anything they had ever seen. Ashore at Eoa it was most violent—houses and trees blown down, and all the crops destroyed. It likewise did great damage at Tonga-tabu, and was also felt very severely at the Hapai Islands and Vavao. Here Mr. Thomas, the missionary, was obliged to shore his house up, although it was considered by the natives that a gradual decrease in strength had been experienced in proceeding northward. Still farther North the *Nassau* encountered it in lat. 16° N., in the shape of a heavy gale. At all these places the wind was from the southward; S.S.E. by the ships; ashore they had no compasses, but it certainly was from the southward, and without shifting. I have thus endeavoured to be explicit, through an impression that more is required to be known of hurricanes and gales in localities; and having a strong belief that many of the hurricanes, even those producing the most disastrous effects, will be found very local.

Reverting again to the N.W. monsoon,—at the Salomon Archipelago it commences in December or January. In some years these months are tolerably fine. During February and March strong winds with severe squalls and heavy rains may be expected. April generally is a fine month, with variable winds; also in May there is a good deal of fine weather. The S.E. monsoon sets in strongly in June, with heavy rains and squalls, and continues so until the end of August; in all these months, nevertheless, there are considerable intervals of fine weather. In September the strength of the monsoon is spent, and the weather is more moderate from this time until the return of the north-wester.

Farther to the eastward, about the meridian of Rotumah, the westerly monsoon

is less constant, beginning generally in January, and blowing strongly about seventeen or eighteen days consecutively, then declining; and the easterly wind returning in a fresh breeze for nearly the same period; the westerly wind again intervenes, usually commencing with a gale, and always continuing in a strong breeze, with squalls and rain; the easterly and westerly winds thus alternating until the end of March, when the S.E. trade sets in steadily. Proceeding still farther to the eastward, the westerly monsoon gradually becomes less constant and finally disappears somewhere about the meridian of the Marquesas Islands.

NEW ZEALAND.

The great extent of New Zealand in latitude will lead to the inference that a considerable variation will exist in the winds prevalent in different portions of it. But as it lies outside the verge of those regular winds which characterize the tropical regions, such uncertainty must be expected as is found in similar latitudes, but the predominant direction will be from the northward of East or West. Such, in fact, is found to be the case, from a register kept at Wellington, from October 1840, to September 1842; by which it appears that the northerly winds predominate over the southerly, in the ratio of 432 to 266, but this ratio is unequally distributed over the different seasons. Thus from October to December, the number of days on which the North winds prevailed was 170; South, 72; westerly winds, 8; and variable, 13. From January to March, northerly, 89; southerly 86, being nearly equal; West, 2; variable, 6. From April to June, North, 96; South, 50; West, 8; variable, 22; and from July to September, North, 95; South, 75; West, 4; variable, 7. These results are collected from a table inserted in the Wellington Almanac for 1843. The greatest mean height of the barometer, from the same authority, was 30.105 in. in the month of January, and the lowest mean height, 29.412 in., in the month of June. In Cook's Strait it falls both with a S.E. and a N.W. wind, so that caution is required, but its indications are invaluable.

In the immediate vicinity of the land, more especially in the central portions of the islands, the wind will be found to be deflected by its influence, and this variation necessarily depends on the configuration of the coast, so that no general notion can be given of it without entering into much greater detail than we have either the materials or space to do. These very imperfect remarks must for the present, therefore, close the subject.

HURRICANES.

This very important subject, as at present understood, is a new one in navigation. But it has been so much and so ably discussed, that its nature is now well understood, and by the application of the results of these investigations, much of the danger formerly attendant on navigation in certain regions will be avoided in future.

In the Pacific, like many other of the phenomena there met with, the recorded observations on hurricanes or typhoons are much too scanty to have drawn up any regular system from them; so that for the present it remains for the navigator

to apply "the law of storms," as developed in the Atlantic and Indian Oceans, to these same meteors in the Pacific, and almost without question they will be found accordant, in most instances, with that law.

The subject is a new one. It originated, perhaps simultaneously, with Mr. W. C. Redfield, of New York; with Lieutenant-Colonel Reid, R.E., afterwards governor of the Bermudas; and Professor Dové, of Berlin. To these imperishable names must now be added those of Mr. Piddington, of Calcutta; Mr. Espy, in America; Dr. Thom, in the Indian Ocean; and Lieutenant John Evans, in England. To these gentlemen the navigator owes a lasting debt of gratitude. What may be the originating cause of these revolving winds is involved in some obscurity. But their effects being known for practical purposes, this is less important. Sir John Herschel, in his "Astronomy," written, it should be observed, some years before the views of Reid and Redfield had been promulgated, makes the following remarks (page 132):—"It seems worth inquiry, whether hurricanes in tropical climates may not arise from portions of the upper currents prematurely diverted downwards before their relative velocity has been sufficiently reduced by friction on, and gradually mixing with, the lower strata; and so dashing upon the earth with that tremendous velocity which gives them their destructive character. Their course, generally speaking, is in opposition to the regular trade-winds, as it ought to be in conformity with this idea (*Young's Lectures*, vol. i. p. 704). But it by no means follows that this must always be the case. In general, a rapid transfer either way, in latitude, of any mass of air which local or temporary causes might carry *above the immediate friction of the earth's surface*, would give a fearful exaggeration to its velocity. Wherever such a mass should strike the earth, a hurricane might arise; and should two such masses encounter in mid-air, a tornado of any degree of intensity on record might easily result from their combination." That these meteors are confined to the lower strata of the air has been observed, and will therefore bear out the foregoing remarks; their height, compared with their diameter, is very inconsiderable—they may be said to be a revolving disc.

Another (but less feasible) theory, put forth by Mr. Thomas Hopkins, is that they arise from the unequal distribution of aqueous vapour in the air. In North latitude the southern edge of the trade-wind is more highly charged with this than the northern. Hence on its ascent from condensation, there is a greater vacuum on that side than on the other, and consequently a more rapid rush of air from adjoining parts of that side into the vortex, which might possibly give it a spinning motion in addition to its ascending motion.

Without pursuing these speculations further, it is certainly apparent that their origin and progress are connected in some way with the direction and regularity of the trade-winds. And in the following remarks on their distinctive characteristics, the conclusions that have been arrived at will be stated without giving the evidence upon which they are based, as this would employ too much of the reader's time for the present work.

The hurricane is purely an atmospheric phenomenon. All means of ascertaining the condition of the atmosphere thus become of essential service. The direction of its motion is the one that manifests itself most clearly. Other points are ascertained by the barometer, a most essential instrument for the mariner, and as

this is one of the most important in our present subject, the following remarks will form a fitting introduction to it.

The **BAROMETER** measures the *weight* of the atmosphere above its place, in exactly the same manner that other ponderables are weighed in a balance. The weight of the column of mercury in the tube is exactly equivalent to the weight of a column of air of similar diameter the height of the atmosphere, therefore any change in the one affects or is affected by the other. Now, it has been found that strong winds lower the barometric column, therefore there is less superincumbent air at those times; and this principle most efficiently indicates some of the atmospheric conditions which forbode the approach of or alteration in a storm. The *mean* height of the barometer varies very considerably in various parts of the world, and therefore its changes rather than its absolute height is the most important consideration.

The *Aneroid barometer* is an instrument which would prove of infinite service to the commander in those latitudes where the limited range of pressure corresponds with far greater changes in atmospheric phenomena than is the case in Europe or the North Atlantic, where a much greater variety of causes operate to increase the fluctuations of the mercurial column.

This little instrument is becoming well known. It is of the size of an ordinary chronometer. The mechanism consists of a small metallic cylinder, which is exhausted of its internal air. The sides of this cylinder are prevented from collapsing by a series of springs and levers, which latter act on a moving hand, showing the equivalent of the height of the mercury in an ordinary barometer. The differing atmospheric pressure on the exhausted cylinder causes its sides to close with greater, or the springs to separate them with less external pressure, thus varying the index with the condition of the atmosphere.

One great advantage in it is that its variations occur simultaneously with their causes. In the mercurial barometer the friction of the mercury on the tube and other reasons concur to make the rise or fall of the column to take place slowly, and at some time after the moment that the atmospheric changes they indicate has occurred. At times it is of the utmost importance to the mariner that he should be apprised of the instant of change in the barometric pressure, as in the passage of a cyclone or revolving storm, and in this case the Aneroid barometer becomes of singular advantage.

Within the tropics, also, and more especially in a great portion of the Pacific, as is elsewhere mentioned, the variations in pressure and temperature, both of air and sea, are comprehended within much narrower limits than they are in higher latitudes or different regions. Therefore, to judge of the atmospheric changes by the criteria usually adopted, in England for example, of a certain variation being indicative of some certain phenomena, is manifestly absurd when these indications are quite inapplicable. One tendency to mislead, at least to the ordinary mariner, is the manner in which the barometric scales are arranged in Europe for European purposes; fair, change, set fair, or stormy, mark the heights of the mercury indicative of a totally distinct character in the atmosphere in the tropical regions or elsewhere, and ought therefore either to be entirely disregarded or obliterated from those barometers which are to be used in other regions. It is perhaps to

this cause that the opinion is owing that the barometer is useless in these parts ; others, whose more close attention has elicited the fact, declare it to be invaluable. The Aneroid barometer, by clearly showing minute changes, and that, too, at the very instant of their occurrence (unlike the mercury, which requires a close examination to detect any alteration, and that not taking place until after some time has elapsed), in this case is invaluable.

But a *caution* respecting them must be given. Like all other pieces of mechanism, they are liable to become deranged, and, as in the case of chronometers, unless some means be used to detect any variation from the correct standard, they must not be implicitly depended on. The minute comparisons of their action which have been made by Professor Schumacher, Colonel Lloyd, the United States' coast surveyors, and others, have demonstrated much irregularity and apparent caprice in their movements, so that, as a refined scientific and independent instrument, its value is very much less than was at first hoped for. It must therefore hold the relative value to the mercurial barometer that the job watch does to the ship's chronometer. By testing its action and remarking its variable index error by the ordinary barometer, it will hold a high place among the useful instruments to aid navigation.

It is perhaps scarcely necessary to allude to the *Sympiesometer* here ; it is an instrument which obviates many of the disadvantages which exist in the mercurial barometer, and is well known to seamen. From these preliminary remarks we pass to the phenomena of Hurricanes, or *Cyclones* as they have been termed, from a Greek word signifying revolution, or *Typhoons*, a word of somewhat uncertain origin.

The REVOLVING STORM consists of a circular, or nearly circular, vortex, the wind revolving round an axis of greater or less diameter with great rapidity.

Besides this circular motion round its axis, the whole storm has a progressive motion, which is also very various in its rate ; so that the winds which may be experienced during their passage is the result of these two motions combined. But as its progressive movement or translation, in general, is so much less than that of its revolution, in estimating the changes of the wind, it is perhaps less trouble to disregard it, except as an element of change.

The diameter of these vortices varies from 40, 50, or 60 miles up to 600 or even 1,000 miles. This probably increases with its onward progress. In their centre is a calm space, around which the whole wind revolves. This central calm or focus may be of considerable diameter, perhaps 20 miles, or in others, it is thought, is almost nothing. This is the most dangerous part of a revolving storm, as in its passage the wind suddenly shifts from one point to the other, and here it is generally most violent. The time of its passage varies from a few minutes to eight hours.

The *path* of these hurricanes is found to be opposite in the two hemispheres. They occur generally in the *western* parts of the respective oceans, commencing frequently between the latitudes of 10° and 20° .

In the *northern hemisphere* their direction is first towards W.N.W., then gradually bearing towards the northward to about the latitude of 30° , when they bear away to N.E., then E.N.E.

In the *southern hemisphere* they are first W.S.W., then S.W. and South, turning off to S.E. and E.S.E.

The *direction of the wind's revolution* around the axis is also opposite on each hemisphere.

In the *northern hemisphere* it revolves in the *opposite* direction to the hands of a watch, or *against* the sun's apparent course. In *South* latitude in the *same* direction as the sun, or the hands of a watch.

The curve which the wind describes is in reality a spiral around the focus. If these were drawn, that for the northern hemisphere would be curved in the same direction as the figure 6; for the southern it would be this figure reversed, or like the figure 6 on the back of the paper, both beginning at the top. These principles should be thoroughly understood before applying them to practice.

The direction of the wind on any portion of this circle will be a tangent to the radius of the circle; thus the focus will be 90° , or eight points from the direction of the wind; if the wind be East or West, the centre will be North or South, according whether it is North or South latitude, or the ship be on the northern or southern edge of the circular storm.

In North latitude the revolving wind is always turning to the *left*; that is, if the wind is N.W., it will presently be N.W. by W.; hence, if the observer stands with his back to the wind, the focus will be on his *left* hand, eight points from the wind's direction.

In *South* latitude the wind is always turning to the *right*, and the focus is on the *right* hand of the observer with his back to the wind.

A transparent diagram, in which the compass is shown with the wind marked as concentric circles—for North latitude, the East wind blowing at the North point; for South latitude, the West wind on the North side—is recommended by Colonel Reid. These may be drawn on common paper, which being dipped in turpentine becomes transparent. In Piddington's "*Horn Book*" are some horn scales made for the purpose. By laying these on the chart, the ship's place corresponding with the proper wind on the circle, shows the direction of the focus.

It will be very readily understood that the whole care of the shipmaster when he first encounters a storm is to know how it may be avoided, or otherwise its destructive effects may pass over his vessel in its utmost fury, and the application of the law then becomes his safeguard. When the expected hurricane reaches the ship, the first point that requires to be known is what part of the verge it is on which the vessel may be; that being ascertained, it is usually comparatively easy to get out of its way, or at least to avoid its worst effects.

Colonel Reid's Rule for Laying Ships to in Hurricanes.—That tack on which a ship should be laid-to in a hurricane has hitherto been a problem to be solved, and is one which seamen have long considered important to have explained.

In these tempests, when a vessel is lying-to, and the wind veers by the ship's head, she is in danger of getting sternway, even when no sail is set; for in a hurricane the wind's force upon the ship's masts and yards alone will produce this effect should the wind veer ahead, and it is supposed that vessels have often foundered from this cause.

When the wind veers aft, as it is called, or by the stern, this danger is avoided, and a ship then comes up to the wind, instead of having to break off from it.

If great storms obey fixed laws, and the explanation of them in this work be the true one, then the rule for laying a ship to follows like the corollary of a problem already solved. In order to define the two sides of a storm, that side will be called the right hand semicircle which is on the right of a storm's course as we look in the direction in which it is moving, just as we speak of the right bank of a river. The rule for laying a ship to will be, *when in the right-hand semicircle to heave-to on the starboard tack, and when in the left-hand semicircle on the port tack, in both hemispheres.*

The first of the two figures here inserted is intended to represent one of the (West India) hurricanes moving from the S.E. by S. to N.W. by N. in the direction of the great arrow drawn across it. The commander of a ship can ascertain what part of a circular storm he is falling into by observing how the wind begins to veer. Thus, in the figure the ship which falls into the right-hand semicircle would receive the wind at first about East by North, but it would soon veer to East as the storm passed onward, and supposing her lying-to. The ship which falls into the left-hand half of the storm would receive the wind at first at N.E.; but with this latter ship, instead of veering towards the East, it would veer towards the North.

The explanation of the rule will be best made out by attentively inspecting the two figures. In both the *black ships are on their proper tacks*; the white ships being on the wrong ones.

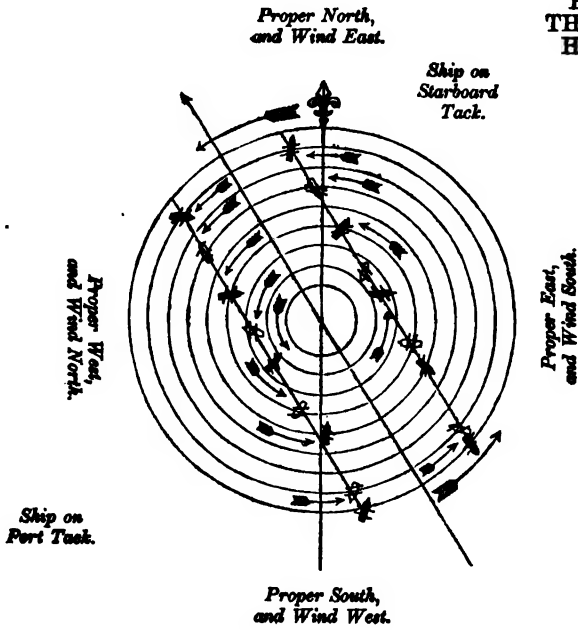
The second figure is intended to represent one of those hurricanes in South latitude (which pass near the Mauritius) proceeding to the south-westward. The whirlwind is supposed to be passing over the vessels, in the direction of the spear-head. It will be seen that the black ships are always coming up, and the white ships always breaking off; and that they are on opposite tacks, on opposite sides of the circles.

If hurricanes were to move in the opposite course to that which they have hitherto been found to follow, then the rule would be reversed, for the white ships would come up, and the black ships break off.

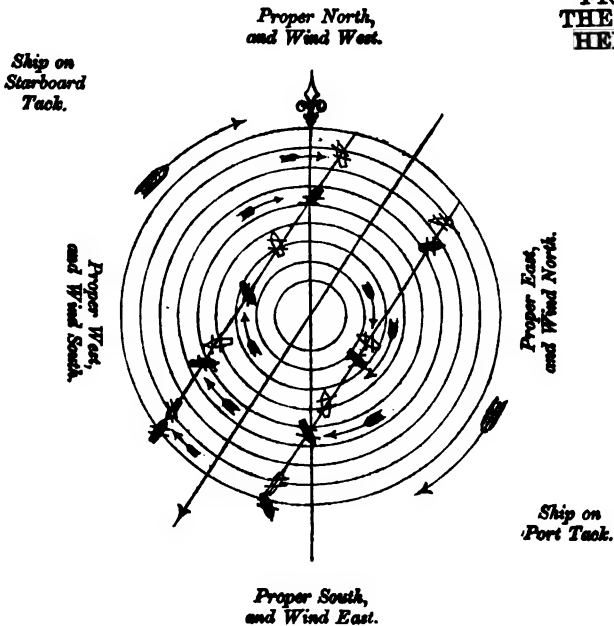
From this rule it follows, that if two ships be hove-to within the compass of the same revolving gale, and on the same tack, and the one ship comes up while the other ship falls off, the centre of such revolving gale will be passing between them. This will assist in judging approximatively of the track gales may be following, even in the case of single ships.

There are, however, reasons for modifying this rule. If we look at the black ships in the *left-hand semicircle* of the figure for the *northern hemisphere*, and in the *right-hand semicircle* of the figure in the *southern hemisphere*, it will be seen that the black ships point with their heads to the storm's centre. If they forge ahead, they will draw towards the storm's central track. It may therefore be preferable, as a general rule when heaving-to in a revolving gale, to bring the ship to the wind on the starboard tack when on the North side of the equator, and on the port tack when on the South side of the equator. Then will the ships, when shooting ahead, be gradually moving away from the storm's centre.

**FIGURE FOR
THE NORTHERN
HEMISPHERE.**



**FIGURE FOR
THE SOUTHERN
HEMISPHERE.**



In a progressive storm there will be one quadrant in which it will be more dangerous for a ship to scud than in the other, that being the one in which a vessel steered so as to sail before the wind, would be led in advance of the centre of the storm's track. The rule thus applies to three-quarters of the storm's circle. But care should be taken lest in its application a ship be carried into what has been called the quadrant of greatest danger, and before the centre of an advancing storm. The practical seaman knows that a ship is difficult to steer during a storm, and in a high sea, with the wind on the quarter.*

It is evident that if a ship is overtaken by a storm in its progress, it must be the advancing edge or semicircle which envelopes her, but this may not always be the effect of its progressive motion. As the storm gradually increases, all the irregularities of dimensions and form must doubtless occur on its outer edges; so that by this extension of area it may reach a ship when she is to the North or South of the centre, or even to the eastward of the North and South diameter; that is, in the advancing semicircle.

Besides this, the most usual evidence of change, the focus itself will sometimes have a tortuous or spiral motion. This will cause great perplexity and apparent want of regularity, yet the storm itself may be strictly a revolving one.

One cause of complexity in revolving storms is, that they have been known to separate into two, and in other cases two or more storms encountering each other have coalesced.

There is one position in which a ship may enter a revolving storm which is attended with the utmost danger, that is, directly in its path. In this case the wind will not shift, as it would on either side of the line of progress, but continue in its first direction until the focus be passed, when it would *suddenly* shift to exactly the opposite point, a change which the seaman would dread.

The focus, as has been before mentioned, is the most dangerous part of the hurricane. Near it the wind blows more furiously, added to which is the danger of a sudden shift. Here, too, the sea becomes confused; the waves raised by the opposing winds surrounding it here interfere with each other, and the appearance, as described by some, is that of the water rising and falling in pyramidal heaps, the usual regular succession of waves being obliterated. Sometimes the sea rises or subsides in a very sudden manner.

The form of the hurricane may not be quite symmetrical. The advancing semicircle becomes flattened, especially when approaching land, and the following portion becomes lengthened, so that the whole figure becomes ellipsoidal, and the shifts of the wind around the focus will not be perfectly regular in consequence.

When there is abundance of sea-room, as is more particularly the case in the Pacific, the danger of these hurricanes becomes very much diminished, and the mariner is left much more free to choose the best course for avoiding their fury.

But in addition to this advantage, another presents itself. It may, under certain circumstances, be made available for expediting a passage. This has been proposed by Mr. Piddington:—In order to benefit by the hurricane, several con-

* An Attempt to Develop the Law of Storms, third edition, 1850, pp. 509—512; and the Progress, &c., of the Law of Storms, and of Variable Winds, 1849, pp. 25—28.

ditions are necessary, and it need not be again insisted on, that any error or ignorance of the centre of rotation may be fatal. Of course the first consideration is, in what part of the circumference is the ship, and in what bearing is its centre? then, at what rate, and in what direction, is it travelling? and is it so violent that the ship cannot weather it? All these things must be weighed well by the mariner before he endeavours to lay his ship on that tack which will appear the best to forward his voyage. Should the storm be advancing in the same direction as his course, and the position of the ship be on the anterior verge, should it travel at a rate above that which he can keep up with it, it is evident that it will pass over him, and the consequences need not be remarked upon. Should the vessel be upon the posterior verge of the hurricane, it will, if travelling at 20 or 30 miles an hour, soon leave it, and then no advantage can follow.

Thus, to "make use of a hurricane," several conditions are absolutely necessary. These are—1. The ship must get into the storm precisely when the wind blows fair for the prosecution of the voyage, which is quite a matter of chance. 2. If she happened to do so, she must, to derive benefit, regulate her speed exactly to that of the meteor. Could she do that at pleasure, there would be no difficulty in ascertaining the fact of her preserving her station or not, by the wind remaining steady, or veering; but there is a necessity that would bind her, and which cannot be evaded with impunity when a high sea follows—she must carry a certain proportion of sail, to prevent her from being pooped. Now this sail may give her a greater velocity than the meteor at the time; hence she would run ahead of it. Again, the rate of the meteor may be greater than her utmost speed; hence she would be ejected.

Indications of a Hurricane.—One premonitory evidence of the approach of a hurricane is the waves, which are raised by their action. In the open ocean, when the waves have free action in deep water, the unbroken swell of the ocean travels with immense velocity, rising at times to about 30 miles an hour. Any extraordinary swell or rollers, more or less confused, may be taken as the evidence of some distant storm. This point has been adverted to in the Atlantic Memoir, and also in the Ethiopic Directory. But it may be very distant; still such warning, it may be of an approaching storm, ought not to be disregarded.

Bad weather at sea is usually accompanied by a clouded or overcast sky: but all accounts agree in describing a hurricane to be accompanied by a remarkably dense bank of clouds, of a dark or leaden appearance, which is sometimes visible from places not touched by the hurricane. It may be seen, perhaps, twelve hours before the wind comes on. Scud flying about, of course, is a sign of nearer approach. An unusual glare or colour in the light, more commonly of a red tint, has often been noticed. A noise in the air has been frequently remarked before storms.

All these indications may precede the fall of the barometer, which is the best monitor of their approach, but they ought not to be disregarded.

Within the tropics, as has been repeatedly remarked, the height of the mercury is very nearly constant. Any change, especially its falling, is an important admonition, but some cases are stated in which no warning was given.

Some time previous to the commencement of a hurricane, the mercury will suddenly rise above its ordinary level; soon after it will begin to fall, and the wind probably rises, showing that the storm has begun. The mercurial column

then begins to descend rapidly at first, and then more slowly, till the centre of the hurricane has passed over, when it begins gradually to rise, and the reverse of the commencement ensues ; it attains a higher level, and as suddenly falls to the mean height. This is supposing a case where the whole of the meteor passes over, and the centre is crossed ; the mercury showing the quantity of air above. Upon a little consideration, it will be evident that the form of the upper surface of the revolving storm, or the section of the vortex, is described by the variations in the barometric column. It by no means follows, that, practically, this will always be found : a ship may only skirt the exterior of the storm, and consequently the mercury will only rise or oscillate, according to the relative position of the hurricane and the ship ; but it may be taken as an indication, when the barometer begins slowly to rise after being depressed, that the greatest danger has passed over, or that the ship is steering away from it. Therefore, should there be any sudden change in the barometer, either rising or falling, its indications should never be neglected, especially during the period, and in the regions subject to these storms.

In applying the law of storms to the phenomena which have been recorded in the Pacific, we shall find the materials very scanty. Some detached notices have been given in the preceding pages of such hurricanes occurring in various localities. But there is no doubt, that now special attention is drawn to the subject, that very much may soon be gathered.

The untiring industry and zeal of Mr. Piddington has collected nearly all that is known as yet, and in his work, pages 44 to 53, they are related.

In the North Pacific, Admiral Krusenstern encountered one in 1804, in lat. 31° to 32° N., in sight of the South coast of Japan, and found it was travelling due northward.

At Chusan one occurred in September, 1843, coming from the S.E. ; they are uncommon here. Another, between the North end of Formosa, the Loo Choo Isles, and the China coast, was experienced by the ship *Cacique*, in September, 1843, also coming from the S.E. Another was felt by H.M.S. *Ringdove*, in September, 1846, in the Straits of Formosa, from the S.E.

Farther to the eastward, at the Arzobispo Islands, storms are said to be frequent, and come from the eastward. In the space between the Philippines, the Bashee Islands, Formosa, and the Loo Choo group, to the West and North, and the Bonin and Mariana Islands to the East and South, typhoons (or cyclones) are excessively sudden, and certainly come from the eastward. H.M. steam-vessel *Driver* encountered one in October, 1845, in lat. 17° N., lon. 127° E. These and numerous others occurring chiefly in September, October, and November, are cited as having been experienced in this part of the ocean by Mr. Piddington.

Among the Marianas and Carolines storms occur, but we have no authority, except that of analogy, to pronounce them to be rotary.

Of the vast extent of the North Pacific, we have but very little information on this head, and therefore cannot lay down any distinct notion as to the occurrence of rotary hurricanes in its eastern portions.

The Southern Pacific Ocean.—We have here a better groundwork to assert the character and occurrence of the true cyclones ; and as Mr. Piddington states all that can at present be said on the subject, we quote his words :—

In the tropical regions of the South Pacific, from the barrier reefs of Australia through the numerous groups of islands to the Low Archipelago, and perhaps even to near the coast of South America, and from the equator to lat. 25° S., there is no doubt that true hurricane storms (cyclones) occur of as great violence at least as those in the North Pacific just alluded to; but from the scattered accounts of single ships, or missionary residents on the various islands, we cannot say anything positive as to their tracks, though they appear to come from the eastward amongst the islands, and sometimes to curve to the southward. The following are a few notes. The seasons at which they prevail seem also to be the same as those of the Mauritius and Bourbon.

At Viti-Levu, in the Feejee group,* in February, 1841, a well-defined circular storm (cyclone), tolerably observed, seems to have moved to the southward, and, though it lasted four days, was not felt at Tonga, 8° or 10° to the S.E. of it.

At Apia Harbour, in the Samoan group (Navigator's Islands), lat. 14° S., on the 16th of December, 1840, a true hurricane storm (cyclone), of great violence, with a fall of 4 inches of the mercury (by a damaged barometer), was observed, moving from the North to the southward; and four years previous, another, also well defined, moving from the N.E. to the south-eastward, the change of wind being from S.E. to N.W. The space between the Samoan (Navigator's) Islands and Friendly Islands is said expressly to be subject to violent hurricanes, and that scarcely a year passes without some of the Friendly Islands suffering from them. Their violence is such that many of the American whalers have been made complete wrecks of by them; two were lost in 1842 (year uncertain) at the Navigator's Islands.

At the Kingsmill group, *on the equator!* violent storms, which appear to be typhoon-like, are experienced.

At Vavao, in the Friendly Islands, lat. 19° S., lon. 173° W., in 1837, the American whaler *Independence* was driven on shore by "a hurricane," and taken off by a shift of wind.

The account of the storm at Raratonga, in the Hervey Islands, in lat. 19° S., lon. 160° W., described by Mr. Williams, and quoted by Colonel Reid, gives us unfortunately nothing further than the certainty that hurricanes (cyclones) prevail there at times.

Mr. Thom (page 341) says:—"In December, 1842, H.M.S. *Favourite*, on her way from Tahiti to the Island of Mangeea, met with a storm of a rotary kind, and so severe, that the vessel was hove-to under a maintopsail. Capt. Williams was warned of a hurricane before his departure, which shows that storms of this kind are familiar to the natives."

At New Zealand there is no doubt that true rotary hurricanes (cyclones) sometimes occur, and these of considerable violence. In the U.S. Exploring Expedition, vol. ii. p. 381, is a very good account of one which occurred February 29, 1840, at the Bay of Islands, said to have been the severest which the missionaries had experienced there. It was felt at other stations, with all the veerings,

* United States' Exploring Expedition, vol. iii. p. 321.

calm centre, &c., of a true tropical hurricane (cyclone), its course being to the south-westward.*

On July 28, 1840, H.M.S. *Buffalo* was wrecked in a heavy gale, which lasted three days, at Mercury Bay, New Zealand. About that time also three American whalers were wrecked at Port Leschenhault, in one of the strongest hurricanes ever experienced by their commanders.

In the great space lying between Van Diemen's Land and Cape Horn, we have scarcely any observations of rotary storms, but in a capitally well-kept log of the ship *Lord Lyndoch*, Capt. Clapperton, now master-attendant at Calcutta, we find that in the month of December, 1820, in lat. 45° S., lon. 117° W., a "gale was experienced which veered from N.W. to S.W. in fourteen hours, or about half a point an hour, in which time the ship, standing to the N. 60° E., made 83 miles on that course." If this was a rotary storm (and the barometer fell from 29.70 to 29.07), it passed here to the southward, on a track a little to the northward of West, and travelled at the rate of about 15 miles an hour. Judging from the fall and subsequent rise of the barometer, as well as the veering of the wind, there seems no reason to question that it was so.

In a newspaper article, copied from the *Sydney Herald*, are the following (imperfect) extracts and notes:—"So completely does the law of rotation appear to be from left to right, in gales of wind off the coast of Australia and on the neighbouring ocean, that it is scarcely possible to escape the observation, in perusing the log-books of any extended cruise. One further example to show this shall now be quoted.

"The whaler *Merope* left Sydney, March 22, 1840, with the wind at South, steering for Lord Howe's Island. On the 27th she was in lat. $34^{\circ} 4'$ S., lon. $158^{\circ} 35'$ E. The order of the wind's changes was as follows:—23rd, at S.E., veering N.E.; 24th, N.N.E. and N.E.; 25th, increasing from N.E., N.N.E., E.N.E., with a tempest; 26th, N.E. to North, with a confused sea, N.W., and drawing to West; 27th, S.W., South, S.S.E., and back to South. The wind thus completed a revolution in five days, on a direct course from left to right.

"Between Australia and America a similar course is pursued by the winds to that which is followed between the Cape of Good Hope and Cape Leemoin, and more than one instance has come before us of vessels having been driven *all round the compass* during a gale, not far from Cape Horn."

The following examples from Capt. Stokes' journal (Voyage of the *Beagle*, vol. iii.) show the general character of the gales on the West coast of South America. About the latitude of 50° S., April 5, 1828, a gale came on from North off Cape Tres Puntas, blowing on the 6th, 7th, and 8th, from North, N.W., and S.W., with squalls, thick weather, and rain. It abated on the 9th, veered to the southward, and then to S.E., when it ceased. This was from *left to right*.

On the 10th of April another gale came on from N.W., which as suddenly subsided in the western quarter. This, says Capt. Stokes, "was singular, for those we have experienced *generally* commenced at North, thence drew round to

* It is said to have passed between the Bay of Islands and the River Thames at the rate of about 340 miles in thirty-six hours, or say, 10 miles an hour. Commodore Wilkes suggests that this may have been the same as that which occurred at the Feejee group, which is very probable.

westward, from which point to S.W. they blew with the greatest fury, and hauling to the southward, usually abated to the eastward of South" (page 192). These gales, therefore, rotate from *left to right*.

It would seem that as to violence, at least, hurricanes are felt as far South as Patagonia, where (Nautical Magazine, May, 1846) "a severe S.S.E. hurricane is said to have swept the coast from the Bay of Camaros to the Island of Desejada, occasioning the loss of twelve English and American vessels." We do not know if it was rotary, or what was its track.

In the Voyage of Don Juan de Ulloa, in 1743, speaking of the weather on the coast of South America, we find some account of storms which resemble rotary ones. In fact, he describes one which he encountered, in April, 1743, in lat. 40° S., which lasted in its full violence from March 29th till April 4th. It began at North, and twice shifted to South, returning in a few hours to North.

Tempestuous weather is equally common in the latitudes of 20° and 23° in the South Sea, as in the oceans of Europe. Along the coasts and adjacent seas the winter begins in the month of June and lasts till October or November, its greatest violence being past in August or September. Storms, which arise with great rapidity, are very frequent during the whole winter; northerly winds are very prevalent, and often of extreme violence, raising a tremendous sea. It often happens that these violent North winds, without the least sign of an approaching change, shift round instantly to the West, which change is called the *Travesca*, but continue to blow with the same force. Judging from this and the rest of the paragraphs, Mr. Piddington says it may be concluded that the storm tracks between 40° and 20° S., between the meridian of Juan Fernandez and the coast of South America, appear to be from westward (and probably from *north-westward*), toward the coasts.

From 20° S. to the equator, and thence to the Gulf of California, our information is still very deficient. Mr. Redfield and Colonel Reid incline to think that the storms on the coasts of Nicaragua, Guatemala, and Mexico,* are connected with those of the Gulf of Mexico, or perhaps originate there. In a recent memoir (American Journal of Arts and Sciences, March, 1846, No. 1, p. 164), Mr. Redfield says:—

"According to Humboldt, both the eastern and Pacific coasts of Mexico are rendered inaccessible for several months by severe tempests, the northers prevailing in the Gulf of Mexico, while the navigation of the western (Pacific) coasts is very dangerous in July and August, when terrible hurricanes blow from S.W. At that time, and even in September and October, the ports of San Blas and Aca-pulco are of very difficult access. Even in the fine season, from October to

* In a former page (part i. pp. 256-7), we have given some remarks on the winds on the Mexican coast, by Commander C. B. Hamilton, R.N. It will be seen, by referring to them, that the coast is highly dangerous in the bad season, between June and the 5th of November. The hurricanes of these months are so much dreaded that trade ceases on all the coast. That peculiar to the region is called the *cordnazo*, or *cordnazo de San Francisco* (the lash with St. Francisco's girdle), because it is thought to occur about St. Francisco's day (October 4th); but it appears that they may be expected at any time between the middle of June and the beginning of November. The squalls and gales usually commence about S.E., and fly quickly round to southward and S.W., sending in a very heavy sea, so that a ship caught at anchor off San Blas or Mazatlan, would have small chance of escape.

May, this coast is visited by impetuous winds from N.E. and N.N.E., known by the names of Papagallo (Papagayo) and Tehuantepec.

"It appears, in like manner, that the coasts of Nicaragua and Guatemala in the Pacific are visited by violent S.W. gales in August and September, known by the name of Tapayaguas, which are accompanied with thunder and excessive rain; while the Tehuantepec and Papagallo exert their violence during a clear sky.

"This seems to show that the so-called Papagallo, Tehuantepec, and norther of Vera Cruz, are but the clear weather side of a revolving gale, like the north-wester of the coast of the United States; each in its turn being but part of a great vertical storm, which, in certain other portions of its area, or route, often exhibits abundance of rain.

"Humboldt suggested that these northerly winds may blow from the Atlantic and Gulf of Mexico to the Pacific, and that the Tehuantepec and Papagallo may be merely the effect, or rather continuation, of the North wind of the Mexican Gulf, and the brizottes of Santa Maria. But the vertical character and determinate progression of violent gales were then unknown, and I cannot doubt that the northers which visit the Pacific coast and the Gulf of Tehuantepec precede, in point of time, the same storms in the Gulf of Mexico, and are identical with them, having commonly in this region a northerly progression."

With this extract we will close this important subject. At some future period the navigator may be presented with something more determinate on the character of the Pacific hurricanes. The present notices will serve to draw his attention to these phenomena.

CHAPTER XXXVII.

THE CURRENTS OF THE PACIFIC OCEAN.

NEXT to a knowledge of the prevailing winds, that of the currents is the most important to the navigator. By the combined action of these two phenomena, and their effects are frequently coincident, a passage may be made in a much shorter period, though apparently by a circuitous route: and it will be the object of the following remarks to point out what is known, and what may be anticipated to be found in the various portions of the Pacific.

Like many other branches of physics, the origin and exciting cause of currents is still involved in some obscurity, though all analogy points to the same source as that to which the regularity of the system of winds is owing—the revolution of the earth, and the consequent unequal distribution of heat. The action of the wind itself certainly has no small share in effecting the circulation, if it be not the sole exciting cause, as there is some reason to suppose. The effect of tides is

also supposed to be another element in their action, but as yet so little is absolutely known of the propagation or progress of the tidal wave, that no deductions can be confidently made from them.

Currents have been distinguished as of two classes—the *drift current* and the *stream current*.

The drift or drift current is the mere effect of a *constant* or *very prevalent* wind on the surface water, impelling it to leeward until it meets with some obstacle which stops it, and occasions an accumulation, and consequently *stream* of current.

The stream current is thus formed by the accumulated waters of a drift current. It is more limited, but it may be of any bulk, depth, or velocity.—(Purdy.)

That ocean waves have a progressive motion is evidenced by their forming the drift current, though it is denied by many that a wave has anything more than an undulatory movement.

There is much greater uncertainty in the ascertaining the rate of currents by the means ordinarily employed than is usually considered. It is pretty certain that much error of dead reckoning, now attributed to the effect of current, would be properly placed to other accounts. Without very great care in the navigating a ship, an exact estimate of their rate and direction cannot be made. Bad steerage, the heave of the sea, imperfection in the log or glass, uncertainty of the leeway, all tend to invalidate the estimate formed without certainty as to the extent of the allowances that must be made on these accounts.

Another point more particularly important in the Pacific is, the wide distribution of fixed points by which the dead reckoning may be positively corrected. The imperfection of observations for longitude, the errors in the rates of chronometers not ascertained but at long intervals, all tend to throw discredit on allowances for current—the usual scapegoat for all such errors.

There is one source of error which, until recent times, has passed unregarded by most, and that is, the local attraction of a ship on her compass. Invariably a compass will be directed to different points according as the direction of her head is varied. In many cases this will amount to one point or more, varying at different times and places according to the trim of the vessel or the magnetic position. This local deviation is usually greatest when the ship's head is East or West, or rather when at right angles to the magnetic meridian. With such an unsuspected source of error in laying down a ship's course, it cannot be a matter of surprise that great discrepancies will be found between her actual and calculated positions. And should all the causes of error that we have enumerated combine to act in one direction, and that direction be attributed to the effect of current, much confusion and doubt must naturally follow.

The current streams of the Pacific are not generally so strongly marked as they are in the Atlantic; and, in many cases, in the open ocean their entire effects would be comprised within the limits of the possible errors from the above sources. But we are not entirely dependent on desultory observations for our knowledge of the Pacific currents, imperfect though it be. Several navigators of high scientific character, with every appliance, have made the currents the subject of long-continued observation, and it is to their labours that we owe the positive groundwork on which the system rests.

The varied action of the wind is certainly most powerful on the surface of the ocean in producing or varying the *surface* currents. To what depth beneath the surface its power descends is not exactly known, but there is a sufficient body of water set in motion to counteract altogether, or to considerably modify, the currents, whose depth is unquestionably very great.

As it is the surface currents which alone actuate a ship's course, these transient drifts, then, have in reality the same importance as those well-marked and permanent currents whose course is well known, and, were it not for this cause, might be infallibly calculated on. It must be to this source that we must attribute those partial drifts which have been encountered in opposition to the general system of the currents, perhaps occasioned by the opposite verge of a revolving storm, which, as is well known, frequently causes a revolving or storm current : on opposite sides of such a meteor we may then find opposing currents, whose effects do not cease until after the exciting cause has passed away into other localities.

The surface drifts may not be very deep, but they may overlay a more powerful current moving in a very different direction : this is frequently found to be the case, and therefore the surface motion may not give any just notion of its real nature.

Violent winds have one effect on the water—that of disturbing the strata, the lower and cooler portions rising to the surface, and thus occasioning veins or streaks of differing temperatures. This becomes more manifest when the storm waves reach a shelving coast, and the deeper lying portions of the water become thus lifted to the surface.

These remarks bring us to another subject—that of the temperature of the ocean. In the ensuing remarks it will be seen that temperature is perhaps the most important element in ascertaining the origin of a current. It has been proposed, in former years, to navigate a ship by means of the thermometer, but later observations have shown that the system is founded on a fallacy.

It originated in a distinct form in a work entitled “Thermometrical Navigation,” by Colonel Jonathan Williams, published at Philadelphia, in 1799, and was promulgated with the idea that soundings or shoal water were indicated by a fall of temperature. This is frequently the case, as is previously accounted for, and the temperature of currents most certainly is thus indicated. The origin of the idea most probably arose from the fact of vessels approaching the American coast finding a very great decrease of temperature on and within the edge of soundings. But this is now otherwise explained. The warm gulf stream skirts this bank in a northerly direction, but *inside* it a *cold* arctic current sets to the southward, and occasions the phenomenon. The same holds good on the Newfoundland banks, the gulf stream skirting its southern edge.

A shoal may have cooler water over it from the fact of the lower strata of a current being diverted *upward* by its shelving sides, and this would be particularly the case after any great disturbance of the surface waves. In the Pacific, therefore, but little dependence can be placed on the thermometer as a safeguard or warning of approach to shoal or dangers.

It cannot be expected that the small isolated and wall-sided shores which bestrew the Pacific can have any influence on the oceanic waters flowing over

them. The vast extent and depth of the current must totally neutralize all effect that these small spaces can exert. Du Petit Thouars gives a notable example of this. On August 14, 1838, the *Venus* was nearing the Marquesas, and the look-out being half blinded by the setting sun, when it was too late a shoal was discovered, although the line had constantly found no bottom at 200 fathoms for some hours previously. The ship was obliged to pass over it in 6 to 8 fathoms, deep water immediately succeeding. There was not the *slightest change* in the temperature, the thermometer invariably showing $26^{\circ}.5$ to $26^{\circ}.8$ (centigrade). This at once refutes the assertion that *all shoals* must be indicated by the decreasing temperature.*

On approaching the land, too, there appears to be some anomalies, which tend to controvert the opinion of decreasing temperature. Du Petit Thouars found the following difficulties. At *Valparaiso* the temperature at the anchorage was 4° or 5° below that in the offing. At *Callao* the variation was only $1^{\circ}.5$; at *Payta*, it was 2° ; at *Galapagos*, only 1° ; at *Monterey*, $1^{\circ}.5$; at *Magdalena Bay*, $1^{\circ}.0$; at *Port Jackson*, $1^{\circ}.5$. On the other hand, there was not the slightest evidence of any action on the land at *Honolulu*, Sandwich Islands (the depth very considerable close to the land); at *Tahiti* (coast perpendicular); at *Awatska Bay*, Kamtschatka; or at the *Bay of Islands*, New Zealand; so that the exceptions are nearly as numerous as the confirmations of the rule.†

The Pacific Ocean being of so much greater extent than the Atlantic, it follows that many of the causes which operate to create a complexity in the current systems in the latter do not apply to the former. In carefully examining the tables of observed temperatures which have been made, particularly by M. Tesson, in the French frigate *La Venus*, it is evident that in the open ocean, beyond the influences of the land, the variations both in the air and water are comprised within very narrow limits, both as to the diurnal and to secular changes. Thus between the tropics the difference of the mean between the hottest season and the opposite does not exceed 3 or 4 degrees of Fahrenheit, and therefore that of the water, as acted on by these causes, must be limited to the same amount. From these facts it is manifest, says M. Tesson, that if we find a variation exceeding 6 or 8 degrees in the temperature of the water in neighbouring points, or in those distant from each other, but lying in the same latitude, it must denote the presence of a current of warmer or cooler water.‡

These are the chief points connected with the phenomena of currents: more extended particulars will be found in Purdy's Atlantic Memoir, and the reference to numerous authorities are there given. Our present task being confined to those met with in the Pacific, we proceed to their consideration in detail.

The general system of currents in the Pacific are thus concisely described by M. Biot, who has examined with great care all the recent and first observations on this subject:—

Two currents, remarkable for their force, traverse, like two immense rivers,

* Voyage de *La Venus*, tome iii. p. 424.

† Voyage de *La Venus*, tome iii. pp. 423-4.

‡ Voyage de *La Venus*, Partie Physique, tome iv. p. 341.

the whole of the regions of either ocean, the Atlantic and the Pacific. The first, appertaining to the latter, seems to flow from the extensive line of antarctic coast discovered by Sir James Ross in 1841, and from the great icy barrier which extends from thence towards the pole, perhaps as far as the pole itself. At its entrance into the Pacific this current advances to the North; but before New Zealand it trends to the East, and proceeds until it strikes the western coast of Patagonia. This obstacle separates it into two branches. The minor one re-descends towards the South and doubles Cape Horn, the principal turns to the North, following the coasts of Chile and Peru, lowering the temperature of these countries. But when it reaches the equator its further advance to the North is prevented by the tongue of land lying obliquely to the meridian which connects the two Americas. Meeting with this, the current turns to the West, thence continues to advance with scarcely any obstacle in this direction until it is again arrested by Oceania, the India Archipelago, and the Asiatic continent. Arrived here, it subdivides, following the inflexions of the coasts it strikes against; one branch flowing to the East of Oceania trends to the South; another enters and is lost in the Indian Archipelago; a third, reflected by the eastern coast of China, turns to the northward. But this soon meets directly in its course with the Japanese Archipelago, the Peninsula of Kamtschatka, and the eastern prolongation of Siberia. Besides this, it is driven towards the equator by the polar current which issues from Behring's Straits. Under the combined influence of these causes, its course bends to the eastward, and following the direction now quite open to its progress, it proceeds to the western shores of North America, above the Oregon territory. Again deflected from its eastern coast, it bears to the South along the Californian coasts, and again entering the great equatorial currents it bears away once more to the westward.

By this movement in continual circulation the cool waters coming from the South pole become heated under the equator, and at length moderate the region of the northern climate they next reach. Thus the branch of the equatorial current which ascends to Kamtschatka is the cause that the sea never freezes around the southern extremity of this peninsula.*

Each branch of this system will now be considered in its turn.

1. ANTARCTIC DRIFT CURRENTS.

It has ever been considered that from the Polar regions the waters of the ocean move first in a direction towards the equator, and then towards the East, where, from the configuration of the great continents, they are forced to the northward, and at last uniting with the equatorial drift, bear away to the West, and maintain the equilibrium.

That the former portion of this assertion is at least correct in some degree is shown by the floating masses of ice, which, being detached from their parent locations, are annually brought within the region of more temperate climates in the spring and early part of the summer. However theories might be reconciled with the limited knowledge we possessed till within a recent period, late discoveries

* *Journal des Savants*, January, 1849, pp. 76-7.

must tend to subvert partially the preconceived notions of the origin and progress of the northerly drift from the antarctic polar regions.

The chart of the motion of the waters of the Pacific, drawn up with great labour by Duperrey, is among the first notices which were put before the world of the origin of this Peruvian cold current along the western shores of South America. This work shows by comparison of the observations of the numerous voyagers, as far as such observations could be depended on, that the body of water eastward from the meridian of New Zealand, as far as that of Pitcairn Island, first advances to the northward, then north-eastward, and then E.N.E., driven perhaps by the melting ice and the prevailing S.S.W. winds from the South pole, until it meets the continent of South America, about the parallel of Valdivia or Concepcion, on the coast of Chile. Here it divides; one portion flowing to the northward, forming the Peruvian or Humboldt's current, the other to the southward and eastward, forming the Cape Horn current.

"This view," says Humboldt, "embracing an immense extent of ocean surface, places at the distance of 1,300 geographical miles the origin of the Peruvian cold current, and increases a phenomenon of the southern hemisphere, which has so long occupied my attention, to that of the gulf stream of Florida, as shown by Rennell's researches, if followed upwards from the Agulhas bank, at the Cape of Good Hope."

Much of the speculation as to the origin and progress of these moving masses of water, however, cannot prove useful to the navigator, as too often a more extended examination, embracing more minute particulars, nullifies, or perhaps reverses, the previously conceded axioms. Such may be the case with this antarctic drift. As far as has been ascertained, the whole mass moves in a northerly and easterly direction to the South of New Zealand, about the same as Cape Horn, at the rate sometimes of 20 to 35 miles per day.

Sir James Clark Ross, in his last antarctic voyage, made several experiments in deep sounding and temperature. One of these was on January 3, 1842 (nearly midsummer), in lat. $66^{\circ} 34' S.$; the ships were enclosed in a field of ice, without visible limits, when they let down a sounding line of 945 fathoms, with attached thermometers, which, contrary to all preceding theories and experiments, showed a constantly *increasing* temperature from the surface, at 36° to $39^{\circ}.5$ Fahr. This extraordinary result, so totally at variance with all that had been previously observed, opens a fresh field for speculation. How can it be reconciled with the experiment made by MM. Bravais and Martins, July 20, 1839, in lat. $73^{\circ} 36' N.$, between Lapland and Spitzbergen, in a sea free from ice, when, on the contrary, the deep sea soundings showed a constantly *decreasing* temperature from $42^{\circ}.5$ cent. at the surface to $32^{\circ}.2$ at the depth of 475 fathoms? * These and other similar and perfectly accordant results showed no tendency to arrive at so high a temperature as $39^{\circ}.5$.

* In contradistinction, however, to the evidence which might be drawn from these observations, we may bring forward those of Capt. Scoresby. In lat. $79^{\circ} 4' N.$, lon. $5^{\circ} 4' E.$, at 400 fathoms the temperature was 36° , *increasing* from 29° at the surface; another, in lat. $79^{\circ} 4' N.$, gave 37° at 730 fathoms, the surface being 29° ; a third, in lat. $78^{\circ} 2' N.$, lon. $0^{\circ} 10' W.$, he found 38° at 761 fathoms, the surface being 32° .

Be this as it may, there can be but little doubt of the accuracy of Sir James Ross's observations, as they were perfectly accordant; and following up the experimental investigation, he assumed that there was a zone in the southern hemisphere in the mean latitude of about $56^{\circ} 26'$, the water of which possesses the same unvarying temperature of $39^{\circ}.5$ from the surface downwards. The following observations are those on which Sir James Ross founds his opinion as to the position of the axis of this zone: that is, the positions when the surface water is equal to that at all observed depths, or $39^{\circ}.5$:—

Lat. $57^{\circ} 52' S.$, lon. $170^{\circ} 30' E.$

„ $55^{\circ} 9'$ „ $132^{\circ} 20'$

„ $55^{\circ} 18'$ „ $149^{\circ} 20' W.$

Lat. $58^{\circ} 36'$, lon. $104^{\circ} 40' W.$

„ $54^{\circ} 41'$ „ $55^{\circ} 12'$

„ $55^{\circ} 48'$ „ $54^{\circ} 40'$

Thus, supposing there is a similar belt of uniform temperature in the northern hemisphere, the two would separate the waters of the globe into three great thermic basins, two towards each pole of the earth, and a third through the central part of which the equator would pass. In these zones, then, the whole body of ocean water is of uniform temperature from the surface to the bottom, while on the North and South of them, towards the tropics and equator, water of a higher temperature would float above it, and in those nearer each pole the surface water would be colder. Sir James Ross shows that in lat. $45^{\circ} S.$, the temperature of $39^{\circ}.5$ is only to be found at the depth of 600 fathoms, which is increased to 1,200 fathoms in the tropical and equatorial regions; the surface temperature of the latter being 78° . In confirmation of this, Colonel Sabine found in lat. $20^{\circ} 30' N.$, lon. $83^{\circ} 30' W.$, a temperature of $45^{\circ}.5$ at 1,000 fathoms, the surface being at 83° . Capt. Wauchope obtained in lat. $10^{\circ} N.$, lon. $25^{\circ} W.$, 51° at 966 fathoms, the surface water being at 80° ; and he also found in lat. $3^{\circ} 20' S.$, lon. $7^{\circ} 39' E.$, the temperature of 42° at 1,300 fathoms, the surface water being at 73° .

Capt. Sir James Ross considered that the level of uniform temperature ($39^{\circ}.5$) in the South polar thermic basin descends to the depth of 750 fathoms, the surface then being at 30° Fahr.*

“To estimate a movement,” says Sir Henry de la Beche, “which might be produced by the settlement of any water of the density of $39^{\circ}.5$, striving to occupy an equal depth beneath those of inferior weight, either of greater or less temperature, as the case might be, to the North and South of these belts of uniform temperature, supposing that some approximation to such a belt was to be found in the northern hemisphere, we should compare the distance from these belts with the depths at which given temperatures have been observed. This done we obtain for the slope on either side of the southern belt (assuming a plane for more ready illustration) of about 1 in 1,723 to the 1,200 fathoms of $39^{\circ}.5$ beneath the equator, and of about 1 in 1,136 to the same temperature beneath 750 fathoms in 70° South latitude. So small an angle, with a change of temperature so gradual, could scarcely produce a lateral movement in the mass of ocean waters of geographical importance.”†

* See *Voyage to the South Pole*, vol. ii. pp. 156, 375, 384; *Journal des Savants*, Feb., 1849, p. 72.

† *The Geological Observer*, 1851, p. 112.

The temperature of $39^{\circ}.5$, according to previous experiments on sea water, will not represent its maximum density; a very much lower temperature would appear to be required. According to the experiments made by Dr. Marcet, sea water cooled down to between 18° and 19° , decreased in bulk till it reached 22° , after which it expanded a little, and continued to do so until the water was reduced to 19° and 18° , when it suddenly expanded, and became ice at 28° . According to M. Erman, salt water of the specific gravity of 1.097 diminishes in volume down to 25° , not reaching its maximum density until congelation.

That we know but little of these matters at present is evident from these experiments not coinciding with theoretic results. The temperature of $39^{\circ}.5$ is about that assigned to pure water; sea water ought then to be much lower. But even this fails, for Sir Henry de la Beche found the fresh water of Geneva Lake to remain at $43^{\circ}.5$, or 4° higher than the theory.

2. THE CAPE HORN CURRENT.

It has been stated that the drift current from the antarctic regions, after proceeding to the eastward, strikes the Patagonian coast, and separates into two branches, the southernmost of which is that now to be considered.

Its existence has been questioned, and even denied; but more complete examinations have determined its character, and we here give the facts upon which it rests, apart from any speculative ideas.

The first experiments which afford undoubted evidence were those made by the lamented Capt. Henry Foster, R.N., in H.M.S. *Chanticleer*. From the appendix to the account of his voyage we extract the following:—

At the distance of 3 or 4 leagues to the southward of Cape Horn there is a current running to the E.N.E., at the rate of about 1 mile per hour; but in what manner this current may influence the tides near the shore, or what changes may be produced in the direction and the strength of the current itself by the flood and ebb tides, will require a very extensive suite of observations to ascertain.

The circumstance of there being no well-authenticated account of the existence of a current to the southward of Cape Horn, induced me to throw together the following observations upon that subject, made during the passages of H.M.S. *Chanticleer* from Staten Island to Cape Horn, from Cape Horn to South Shetland, from South Shetland to Cape Horn, and from Cape Horn to Staten Island, during the summer and autumnal months of those regions.

The ship's way through the water was measured by Massey's self-registering log, and the variation of the directing compass was ascertained by actual observation on the course steered, whenever the state of the weather would permit. The local attraction of the *Chanticleer* did not exceed 2° in extreme cases.

The observed places of the ship were computed with every possible care and attention.

The following table comprises those observations:—

Date.	Latitude South.	Longitude West.	Temperature.		Apparent set of Current. True bearings.	Current deduced. True bearings.
			Water.	Air.		
<i>From Staten Island to Cape Horn.</i>						
Dec. 1828						
22nd . .	54 45	63 29	46.5	49.0		
24th . .	55 56	62 08	44.0	43.5	N. 20 E. 15 in 42	} N. 80° E. 11.6' in 24 hrs.
25th . .	56 32	63 06	44.0	46.0	S. 63 E. 13 in 24	
26th . .	56 51	66 17	44.0	45.0	S. 50 W. 8 in 24	
27th . .	56 13	66 51	50.0	56.5	N. 26 E. 18 in 16	
<i>From Cape Horn to South Shetland.</i>						
29th . .	56 18	67 28	47.5	45.0		
31st . .	56 57	65 32	42.5	43.5	No current observed.	} S. 65° E. 11' in 24 hrs.
Jan. 1829						
1st . .	57 40	64 58	41.5	44.0	N. 57 E. 41 in 24	
2nd . .	59 36	65 16	38.5	41.5	S. 55 E. 15 in 24	
3rd . .	60 27	65 28	36.0	39.0	S. 24 E. 7 in 24	
5th . .	62 58	63 01	34.5	38.0	N. 75 E. 13 in 48	
<i>From South Shetland to Cape Horn.</i>						
March						
9th . .	62 30	62 31	34.5	39.0		
12th . .	61 47	64 22	36.0	37.5	N. 25 E. 37 in 72	} N. 49° E. 21' in 24 hrs.
14th . .	58 54	62 29	38.0	39.5	N. 51 E. 54 in 48	
16th . .	58 38	64 36	41.5	43.0	N. 70 E. 14 in 48	
18th . .	56 55	63 57	42.0	43.0	North 69 in 48	
19th . .	56 21	63 58	44.0	45.5	N. 12 W. 6 in 24	
20th . .	56 51	65 18	44.0	45.5	West 22 in 24	
22nd . .	57 21	65 27	43.5	46.0	S. 80 E. 52 in 48	
23rd . .	57 36	66 02	42.0	43.5	S. 70 E. 32 in 24	
24th . .	56 42	67 07	43.0	42.0	N. 71 E. 26 in 24	
25th . .	56 0	67 19	47.0	48.0	N. 72 E. 20 in 25	
<i>From Cape Horn to Staten Island.</i>						
May						
24th . .	55 59	67 14	45.0	44.0		} N. 51° E. 54' in 23 hrs.
25th . .	54 49	63 18	41.5	42.0	N. 51 E. 54 in 23	

The effect which these observations appear to point out, is that of an easterly motion of the sea, in the vicinity of Cape Horn, produced, no doubt, by the prevalence of N.W., West, and south-westerly winds; and although its direction is sometimes much to the North, as well as to the South of the East, this deviation, in all probability, arises from the prevalence or greater strength of the N.W. or S.W. winds during the intervals between the observations, as it was generally remarked that the currents' deviation from the East, towards the North or South point of the compass, was in accordance with the prevalence of one of these winds over the other during the above interval.

The strength of this set appears also to be much influenced by that of the winds, for, during the voyage from Cape Horn to South Shetland, it was found, at the time of meeting with N.E. winds, in the parallel 60° S., that the set to the

eastward was diminished in its velocity to about half the amount we had previously experienced.

From these several irregularities, the individual observations do not admit of any very satisfactory conclusions being drawn; but taken collectively, they indicate an easterly or north-easterly set, as shown on the last column of the table; on looking over which it will be seen that in the voyage from Staten Island to Cape Horn, a current setting N. 80° E., at the rate of 12 miles in twenty-four hours, may be expected in the summer months, and that between Cape Horn and South Shetland, a current setting S. 65° E., of equal strength, was experienced during the same season of the year; while in autumnal months this current was found to set N. 49° E., with nearly twice the velocity. All this seems to indicate that the winds from the south-western quarter, in autumn, are more violent and of longer duration than in the summer season: and indeed, on a review of the winds during the passages in the different seasons alluded to, it was found that N.W., W., and S.W. winds exceeded those from all other quarters put together; in the month of March, in the ratio of four to one; while in the summer months, and during an equal interval, these winds were found to exceed all others in the ratio of two to one only, which points out at once, apart from other circumstances, that the most advantageous part of the year for rounding this noted promontory is the summer months of those regions. And, from the strength and frequency of the gales that were experienced in the month of March, I am induced to recommend the summer season as the proper time for the navigation of those seas; particularly as at that season north-easterly winds may be expected in the parallel of 60° S., and as, in all probability, they continue to blow in a high southern latitude throughout the summer, for we found the north-easterly winds to be the prevailing winds during our residence at South Shetland in the months of January and February.

The next and most important conclusion to be drawn from these observations is, that the set of the flood tide round Cape Horn comes from the S.W.; such, at least, seems to be the case from the observations made during the passage of the *Chanticleer* from Cape Horn to Staten Island, in May, 1829; when, at the time of taking our departure from Cape Horn, it was ascertained to be nearly low water, and on our arrival off Cape St. John the flood tide had just made its mark. The passage from Cape Horn to Staten Island was performed in twenty-three hours, in which interval we had felt the whole influence of two flood tides, while that of one ebb only had been experienced; and on comparing the ship's place, ascertained by bearings at the time of our departure from Cape Horn, with dead reckoning on our arrival off Cape St. John, and kept in the most unexceptionable manner under very favourable circumstances, viz., fine weather, a free though side wind, and the ship's way through the water measured with a self-registering log, a set N. 51° E. (*true*), at the rate of 54 miles in twenty-three hours, was experienced; from which, if 24 miles be deducted for the effect of the previously established current at this season, we have 30 miles for the set of the flood tide at *neaps*, or about 3 miles per hour. It is also to be considered, that in advancing to the eastward the flood tide is prolonged, and, on the contrary, the ebb is curtailed. How far the strength of these tides may have operated in producing

some of the irregularities in the north-easterly set of the sea, deduced from the previous observations when near in-shore, by having been influenced by either tide for a longer period in the interval between the observations, I have not ascertained; but from some notes which were made at the time, I have every reason to believe that the tides caused part of the irregularities in question.

Capt. Wilkes states that he tried the temperature of the water to the East of Cape Horn at the depth of 450 fathoms, and was much surprised to find it only 28° , that of the surface being 44° . This remarkable depression was not verified by other observations, as the next morning he was in soundings of 80 fathoms; bottom temperature 46° , surface 49° , but of the correctness of the observations there was no doubt. This certainly demonstrates that the polar current trends around this promontory; perhaps this might have been a stratum of colder water, raised to a higher level from passing the coast.*

D'Urville also found a current setting to the E.N.E., along the icy barrier of Powell's group; this must be another portion of this great connecting current. That it is not limited to the vicinity of Cape Horn is evident by the drift of the icebergs, which are carried beyond the line where the current is found at the surface, by submarine streams acting upon their submerged portions, a fact well known and familiar on the Newfoundland banks and the northern edge of the Gulf Stream.

There is one incontrovertible evidence of this easterly set round Cape Horn, which, having passed beyond its meridian, bears more to the northward, in the fact of the drift-wood, &c., found on the southern shores of the Falkland Islands. In some places on the coasts open to the South and West great quantities of it will be found, and there are few places between Cape Orford and Choiseul Bay where a ship could not find a good supply of fuel. This wood comes from the shores of Staten Island and Tierra del Fuego, and in confirmation of its origin portions of Fuegian canoes are also met with in the same localities.

In respect to its strength, it may be stated that great quantities of drift, kelp, water-worn trunks and branches of trees, &c., are met with at sea to the north-eastward of the Falklands, indicative of this N.E. current, which have been found at 200 miles to the N.E. of Berkeley Sound. Its velocity, probably, does not ever exceed two knots, its actual set, perhaps, being even less than one.†

3. THE PERUVIAN OR HUMBOLDT'S CURRENT.

The waters of the South Pacific Ocean, apparently from their northward and eastward tendency in high latitudes, described in pages 1224-7, form a current on the West coast of South America, which extends as a mighty river of cooler water from the latitude of Chiloe to the Galapagos Islands on the equator. From its becoming more evident in the warmer and lower latitude of Peru, it has been denominated the Peruvian coast current; from its having been first distinctly explained by the great naturalist, it has been termed Humboldt's current.

Its effects, however, have been long known. In a very early day after the conquest of America, the Spaniards learned to cool their drinking vessels in its

* Narrative of the United States' Exploring Expedition, vol. i. p. 108.

† Vide FitzRoy's Voyage of the *Beagle*, pp. 242-3.

frigid waters in the Bay of Callao, a practice still continued. Another evidence, now traced to the correct source, is the cooler climate which many parts of Peru enjoy, to what their geographical position and natural character would otherwise cause. This is also the cause of the *garua* or haze, which for months together obscures and cools the air in the Peruvian plains. These fogs commence in the morning and are not dissipated till noon, and reappear in the form of heavy dews at night.

The first elimination of this current is due, as above stated, to Humboldt, in the autumn of 1802. The account was published by Professor Berghaus, in his *Physikalischer Atlas*, from the baron's manuscript, from which the following extracts are taken :—"The first concern of a traveller, on arriving at the sea-coast, after a long absence in a mountainous country, is to observe the height of the barometer and the temperature of the water. I was occupied with the latter in a district between Truxillo and Guaman, near the Callao de Lima, and on the voyage from Callao to Guayaquil and Acapulco, on a tract of the Pacific Ocean of more than 400 miles in extent, when, to my great surprise, I found that the temperature of the surface of the sea under latitudes where, outside of the current, the temperature ranges from $78^{\circ}.8$ to $83^{\circ}.3$, was at Truxillo, at the end of September, $60^{\circ}.8$, and at Callao, in the beginning of November, $59^{\circ}.9$. The temperature of the air was in the first period $64^{\circ}.04$, in the second $72^{\circ}.86$, and then (which is of importance to remark), $12^{\circ}.6$ warmer than the oceanic current."

This temperature was found to be uniform at Callao, at night only $0^{\circ}.7$ colder than by day ; so that the air could have but little to do with it, as will be more clearly shown presently. Once only did a variation occur ; an immensely high and hollow breaker dashed suddenly in on the shore. Whether this arose from the effect of a submarine earthquake, as is usually considered by the inhabitants, or the effect of a distant storm, the result was that the water was cooled down to $59^{\circ}.0$ and $58^{\circ}.35$ in a few hours. This is easily conceivable ; the lower and cooler strata of water had been disturbed by the increased surface action, and thus becoming incorporated with the upper portion, lowered the temperature. Or it might have arisen from the lower strata of water being driven up-hill toward the shore by the action of the waves, as may be supposed to be the case when a current meets a shoal, and causes the surface temperature to be sensibly lower, from the same mode of action.

From the beginning of November to the end of December, Humboldt observed that the temperature gradually and regularly increased, until it reached the height of $69^{\circ}.8$, a fact more fully established afterwards by Duperrey in 1828. This would accord perfectly with the climate of high southern latitudes.

That it is not a mere surface action is manifest ; a current of cold surface water in temperate climates would soon be precipitated to a lower position by virtue of its greater specific gravity. Nor is there anything in the climate to cause such an anomaly. Besides, we have the direct evidence of the experiments of M. Du Petit Thouars to establish the fact of its depth.

On April 16th, 1837, the frigate *La Venus* was to the S.W. of Chiloe (lat. $43^{\circ} 47'$ S., lon. $83^{\circ} 46'$) ; the weather being perfectly calm, and the frigate carrying no sail, a line of 1,000 fathoms was let down, carrying a self-registering

thermometer. The sounding-line appeared to be perfectly perpendicular, nevertheless the frigate was drifted from South to North, with the velocity of the surface current she was in. If the lead and the case of the thermometer had not found in the descent a strata of water moving in the same direction, and with equal velocity with that of the surface, it would have swerved from the perpendicular, and the variation from this perpendicularity would have demonstrated the difference in direction and strength of the deep-seated currents, but none such was observed.

The Chilian or Peruvian current cannot, then, be considered as a simple and superficial river of cool water. It is produced by large portions of the waters of the polar sea advancing majestically from South to North. The body of the current reaches to and beyond the equator, where it is not less than 973 fathoms in depth.

Besides this we have other facts of its real depth gained during the same voyage. At the experiment above mentioned, to the S.W. of Chiloe, the temperature at the surface was $55^{\circ}.7$, at 445 fathoms $39^{\circ}.5$; and at 980 fathoms, no bottom, $36^{\circ}.2$. Afterwards, the *Venus*, at Pisco, to the South of Lima, where beyond doubt the same current exists, the surface of the sea was $66^{\circ}.2$, and at 117 fathoms it was $55^{\circ}.9$.

Thus, in its passage from Chiloe to Pisco, the surface water had become $10^{\circ}.5$ warmer, while that at 117 fathoms, as may be inferred from the proportional part, had gained only $4^{\circ}.5$.

The limits and extent of this current, or rather, perhaps, we might say, of the superficial portion of it, must vary. As stated in the outset, the cold current bearing to the N.E. from the Antarctic regions, strikes the coast of America about the parallel of Chiloe or Concepcion.* Its breadth, therefore, as far as the latitude of Valparaiso, is open to conjecture; at all events, it is not very rapid in this portion of its course, and therefore more liable to be neutralized by the effects of the winds acting on its surface.

Admiral Du Petit Thouars, in sailing from Easter Island to Valparaiso, in March, 1838, which course is nearly on a parallel, found the temperature of the surface to decrease very gradually through the whole of the track; thus, March 1, lat. $29^{\circ} 56'$ S., lon. $111^{\circ} 8'$, mean temperature, 75° , current, S.E.; March 5, lat. $32^{\circ} 37'$ S., lon. $97^{\circ} 45'$, temperature, 72° ; March 10, lat. $32^{\circ} 44'$ S., lon. $87^{\circ} 24'$, temperature, 69° ; March 17, lat. $33^{\circ} 3'$ S., lon. $79^{\circ} 14'$, temperature, 67° , the current throughout all this period had been more or less to the eastward; March 19, lat. $33^{\circ} 2'$, lon. $76^{\circ} 44'$, temperature, $59^{\circ}.7$; so that according to this, perhaps the most direct observation in this latitude, there is not any very well-defined western limit to it.

Nor does the outer boundary to the North of this appear to be exactly marked by a change of temperature; but its effects may be felt at the distance of 500 miles off the land, in lat. $26^{\circ} 30'$, though it here shows 67° of Fahrenheit, demonstrating that it merges gradually with the warmer body of water to the westward.

* "The change in the direction of this N.E. drift to North is about the Island of Mocha. The frequent wrecks on the coast of Chili are an evidence of this set toward the shore, and another is the difficulty vessels have formerly experienced in gaining a sufficient offing in leaving Valparaiso in order to double Cape Horn."—Wilkes.

Off Callao it would seem as if the trend of the land drove it from the general northerly course parallel with the coast, which it maintains to the southward of this, and on this parallel we may look for the southern limit of its westerly drift at times, but this appears to vary considerably. Capt. Wilkes says that he found the breadth of this stream to be about 100 miles off Callao, but gives no particulars of his observations.*

M. Tesson found, in one spot, about lat. $9^{\circ} 20' S.$, lon. $107^{\circ} 50'$, a singular equality of temperature at the interval of four months (February to July, 1838), it being at both times $77^{\circ}.5$; and here he considers that its southern limit must be placed.

The estimation of Duperrey, who has done more to the elucidation of the currents of the Pacific than any other observer, will place the fact of the difference of the temperature of this current and that of the mean temperature of the latitude in a clear light :—

	Air.	Ocean.
The mean temperature, as calculated for lat. $12^{\circ} 0' S.$, is	$79^{\circ}.34$	$79^{\circ}.70$
But at Callao the mean in February and March, 1823, was	$68^{\circ}.36$	$65^{\circ}.66$
Difference	$10^{\circ}.98$	$14^{\circ}.04$

At Payta (lat. $5^{\circ} 6'$), Duperrey observed the temperature of the current, March, 1823, between $68^{\circ}.90$ and $77^{\circ}.0$; mean $72^{\circ}.95$; whilst in the ocean, outside this cold current, the mean was $80^{\circ}.6$.

Lieutenant Dirckinck von Holmfeldt, at the request of Humboldt, made a long series of observations on this current in 1824-25, which would place the limit of its North direction at Cape Blanco. The change from the temperature of the cold current to that of the adjoining sea North of the parallel of Cape Blanco, is very remarkable. Between the 4th and 5th of April, it rose from 71° and 72° to 80° and 83° .†

Notwithstanding all that has been said respecting the existence and character of this northerly current, it does not appear to be so evident to all as to excite immediate attention in those who traverse it. By some its existence is even denied, though, on the other hand, it would certainly seem without any proper reason.

M. Lartigue, who was in the French ship *La Clorinde*, under the Baron Mackau, in 1822-23, says that the currents always followed the direction of the wind; but his experience would in some degree appear to confirm the observations made by others on this northerly current. He says the *Clorinde* was drifted $2^{\circ} 10'$ to the northward in the space of twelve days in the summer; but in winter the differences to the northward exceeded by $36'$ those to the southward in ten days, the predominant winds being from southward.

M. Lartigue is among the first who noticed a *counter or southerly current* running close in-shore, by means of which he has recommended vessels to get to the southward, when other causes combine; we will again allude to this presently,

* Narrative of the United States' Exploring Expedition, vol. v. p. 471.

† Berghaus' Länder und Völkerkunde, vol. i. p. 587.

but perhaps it was owing to this (eddy) current that a portion of his southerly drift is owing.

Another observer, whose remarks are entitled to every consideration, is Rear-Admiral Lütke, and he, too, does not coincide with the opinion that this is a well-defined current. We quote his remarks:—"At about 15° to the West of the meridian of Cape Horn, and between latitudes 58° and 61° , the currents were very variable, as well in their direction as in their form, and did not at all times obey the direction of the wind. But to the West of Tierra del Fuego, which we rounded at the distance of 300 to 400 miles, and, as far as latitude 46° , with very strong breezes from the S.W. and N.W. quarters, the current ran for six days to N. 52° E., at the rate of 21 miles in twenty-four hours. The immediate influence of the wind on the current was here very evident.

"After gaining, in lat. 44° , the regular wind which prevails on the American coast, we also expected to find a northerly current, which, as is generally supposed, runs along the coasts of Chili and Peru, and brings the cool water within the limits of the torrid zone. With the exception of the day we arrived at Concepcion Bay, when we found ourselves 14' farther North than our reckoning, we did not have a single evidence of a northerly current, but only some slight currents to the East and West. We attributed this to our great distance from the coast, when we entered the regular trades; but between Concepcion Bay and Valparaiso, we did not at any time get very far off the land, and then we did not remark any current to the North; once only we were drifted 13 miles to the N.W.; otherwise, we had no current at all, or else it was to the S.W. During all this period the southerly monsoon only blew for twenty-four hours; the remainder of the time we had light winds from the N.E. or N.W. It may be concluded from this that even here the constancy of the northerly current depends upon the winds from South, and it is from them, perhaps, that it immediately proceeds.

"The daily observations on the surface temperature of the water (by Dr. Mertens) showed nothing more than the ordinary decrease on approaching land, and no evidence of cold-water currents.

"These facts, contrary to the generally received opinion relative to the currents on the S.W. coast of America, were new to us, although the same had been previously remarked by other navigators. Capt. Duperrey deduced from a great number of observations, that the current of cool water flowing along the Peruvian coasts reaches low latitudes in coming from S.W. This current attains the coast of America about the parallel of Coquimbo.

"The currents were variable, between S.E. and N.E., during the time that the very strong breezes from N.W. lasted, which was an entire week during our stay at Valparaiso, and on the parallel of 33° ; they might be therefore directly referred to the action of the wind; but once in the course of twenty-four hours, when the wind blew very strongly, the reckoning did not vary from the observations."*

Without giving any opinion as to the relative weight of the remarks here quoted, it may be averred, that as yet the remarks have not been sufficiently

* Voyage du *Séniavine*, Partie Nautique, p. 184, et seq.

connected or extensive to draw any absolute conclusions from them. The remarks of Capt. FitzRoy as to these variations from the normal character of the stream, or the periodical or occasional reversion of this northerly current, will be interesting.

“The period at which these *southerly sets* take place cannot be foreseen with any degree of certainty. Neither the seasons, the age of the moon, nor the other causes common on almost every coast, seem to have any influence here. The oldest navigators and men accustomed to the coasting trade, can assign no reason for these changes—they only know that they do take place, and endeavour to profit by them accordingly.

“During the continuance of the survey, these *southerly sets* were frequently experienced immediately preceding and during northerly winds; but as this was not always the case, no general rule of the kind can be laid down, although it certainly appears to be a natural inference that there is some connecting link between them, which time and attentive observation will yet reveal. It was also remarked that at times the current was setting to the southward, after a fresh wind had for several previous days been blowing from that quarter. And as no inequalities or irregularities in the coast line seemed to have occasioned this, it only served to awaken curiosity, without affording any clue to discover the source of these singular but interesting anomalies.”*

It is perhaps at the Galapagos Islands that the evidence of the Peruvian current becomes most manifest. The currents, from the concurring testimony of all voyagers, are most remarkable in the vicinity of this archipelago. The thermometer would indicate to a certainty the origin of these strong currents, which chiefly bear to the North and West, but in the earlier voyagers no notice has been taken of this feature. Colnett notices the drift-wood, bamboos, wild sugar-canes, and small cocoa-nuts, lying on the S.E. side of Chatham Island. Capt. FitzRoy mentions one fact which bears very strongly on the subject. The *Beagle* was here in October, 1837. On one occasion the temperature of the sea a foot below the surface, on one side of Albemarle Island, was found to be 80° Fahr., but at the other side of the island *it was less than 60°*. This is a surprising variation, and well worthy of attention to future navigators, who may easily and readily do great service to hydrography by making and recording such observations.

This low temperature of the water, constant or fluctuating, has one remarkable effect, according to Mr. Dana—the absence of all coral reefs around the Galapagos, though they lie much within the limits of the temperature in which the coral building insects can live.†

We will cite a few remarks that have been made in the vicinity of these islands, as it appears that they lie on the verge of different current systems.

First, between Cape Blanco and the Galapagos, Capt. FitzRoy was set 50 miles to the W.N.W. in the twenty-four hours preceding his making the archipelago from the S.E.‡ Capt. Worth, of H.M.S. *Calypso*, also found them to be 25 miles per day to the North and West in 1848. H.M.S. *Conway* was also set

* Voyage of the *Beagle*, Appendix.

† Narrative of the United States' Exploring Expedition, vol. v. p. 471.

‡ Voyage of the *Beagle*, p. 505.

to N.W. at the rate of $1\frac{1}{2}$ knots, in November, 1834.* Lieutenant Foster found the current setting N. 64° W. at the rate of $1\frac{1}{2}$ miles per hour, at the S.E. part of the group.†

Passing to the northward of the archipelago, Colnett found it run so strong to the westward that he was seven days in recovering his position, after killing some spermaceti whales. To the North of Narborough Island he states that it runs 4 or 5 knots to the North. This was in the summer. Lieutenant Foster says that a careful comparison showed the current to run 30 miles N. 60° W. in twenty-four hours, at James Island.‡ Capt. FitzRoy says:—While sailing away from the Galapagos we were impelled westward over a smooth sea, not only by favouring easterly breezes, but by a *current* which set more than 60 miles to the West during the first twenty-four hours after our losing sight of Culpepper Islet, and from 40 to 10 miles each subsequent day, until November 1st, 1835, in lat. $10^{\circ} 14'$ S., lon. $120^{\circ} 35'$ W.§ Thus far as to the north-westerly set of the current around the Galapagos.

To the northward of the line between Cape Blanco and the archipelago, there appears to be a conflict between opposing currents. Though we have no observations as to the relative temperature of these varying streams, yet there is little doubt but that great differences would be found in those which have a southerly set and those to the northward of West.

Capt. Colnett relates a remarkable instance:—In the course of our passage from Cape St. Elena to the Galapagos (June, 1793), we fell in frequently with *streams of current*, at least a mile in breadth, and of which there was no apparent termination. They frequently changed the ship's course, against her helm, half the compass, although running at the rate of $3\frac{1}{2}$ miles an hour. I never experienced a similar current but on the coast of Norway. The froth and boil of these streams appear at a very small distance like heavy breakers. We sounded on several of them, and found no bottom with 200 fathoms of line. I also tried the rate and course of the stream, which was S.W. by W. $2\frac{1}{2}$ miles an hour. These streams are very partial, and we avoided them whenever it was in our power. Birds, fish, turtles, seals, sun-fish, and other marine animals, kept constantly on the edge of them, and they were often seen to contain large beds of cream-coloured blubber, of the same kind as those of a red hue, which are observable on the coast of Peru.|| This is very decisive as to the meeting of different currents. In another part, farther to the North, Colnett found the current running to N.E. 30 or 40 miles a day. Capt. Worth, of H.M.S. *Calypso*, also noticed strong rippling in the space between the islands and the main.

The great bay formed by the continents here seems to be subject to very varying currents, apparently influenced by turns by the Peruvian or by the Mexican currents, according as the relative strength of either becomes greater. Thus Malpelo Island, says Colnett, is surrounded by a strong current, having much the appearance of breakers. This he found setting strongly into the gulf,

* Naut. Mag., 1836, p. 66.

§ Voyage of the *Beagle*, p. 501.

† Hydrol. Mem., p. 58.

‡ *Ibid.* p. 88.

|| Voyage to the South Seas, pp. 45-6.

toward the Bay of Panamá, accompanied by light winds, with thick and hazy weather, at the rate of $2\frac{1}{2}$ miles per hour, to N.E. by E. by compass.* Another writer says that they run violently to the South and West.† That these varying statements should be equally correct is not at all incompatible, though we have no data from which to judge when the inset or outset from Panamá Bay occurs. This uncertainty somewhat embarrasses the navigation between the Galapagos and Panamá. Colnett remarked this on his passage from Quibo Island to the former; he passed through strong riplings and veins of current bearing to West;‡ at another point they might have set to East.

There is, probably, another evidence that the Peruvian current is not altogether diverted at Cape Blanco, as has been supposed by Humboldt and others; it is evident, from what is above stated, that at times it runs to N.E. in the offing; and just to the eastward of Cape San Francisco, off the town of Atacames, is a long shoal spit running out 11 miles from the land; it is mentioned on page 205 (Part I.). This and the irregularity of the depth off this part of the coast, may warrant the inference that they are the effect and result of the strong and conflicting currents which set into and out of the bay.

This part of the subject need not be pursued further. From what has been above shown, but little dependence can be placed on the certainty of any particular drift in this quarter. Therefore the navigator must be guarded against their insidious and violent effects.

Of the VELOCITY of the Peruvian current, in addition to the remarks incorporated above, the following may be quoted.

Humboldt writes:—An intelligent Spanish seaman, Don Josef de Moraleda, commanding the ship in which I made the voyage from Callao to Guayaquil, assured me that in the archipelago of the Islands of Chonos and Huaytecas, the coasts of which he had explored, he found the movement of the water which flows along the coast towards the North to be very slow. On the surface it only moved at the rate of from three to five-tenths of a mile per hour, as in a drift-current; but careful observations with the lead had shown that, at a depth of from 12 to 15 fathoms, the current in the same direction is much stronger. The agitated parts of the water, flowing between warmer layers, long maintain the low temperature of higher latitudes, and remain at a depth corresponding to their specific gravity.§

The United States' Exploring Expedition estimated the effect of current in the passage between Valparaiso and Callao as 171 miles, but the direction was nearly due West; so that the trend of the land deflects the current from its northerly course, which it again resumes after passing the Pisco.||

Between Cape Horn and Valparaiso Capt. Wilkes states that he found the drift to be 254 miles, in a direction North by East.

Humboldt says:—"From Valparaiso and Coquimbo, but especially from Arica, North to Lima, the current at the strongest runs from 12 to 14, and sometimes even 18, miles in twenty-four hours.

* Colnett, p. 66.

† Naut. Mag., 1837, p. 611.

‡ Colnett, p. 138.

§ Berghaus' *Physikalischer Atlas*.

|| Narrative of the United States' Exploring Expedition, vol. v. p. 471.

"In this, as in other currents, when it meets with an impediment by striking the coast, its velocity is increased, and thus the greatest rate is close in shore. The force of this current is the cause why ships which, at the time of the garua, sail from Quilca to Callao cannot obtain sights for latitude during long intervals; the fog, too, preventing their making out the land, they are drifted unexpectedly to the North of Callao, to Huaura and Guarmey, and still consider themselves to be, according to the dead reckoning, to the South of their port. This haze is most dense between Pisco and Lima."

4. THE EQUATORIAL CURRENTS.

This great extent of moving water, obeying the same general law as the trade-winds, advances across the entire breadth of the Pacific, from the coasts of Central America to those of the Indian and other archipelagoes in the West, within the tropical limits.

It must not be understood, however, that the whole space above indicated is occupied by one unvarying westward tendency of the currents, inasmuch as many anomalies and conclusions apparently opposite to this notion may be derived from the observations that have been made. Yet the general assertion is correct. Why it is that the currents should be in many cases quite imperceptible, or even flowing in a contrary direction to that which all reasoning and analogy, drawn from known facts, would indicate, is a problem yet to be solved. In the remarks that have been made upon the winds in previous pages, it is shown that the trade-winds in the Pacific, away from the influence of the land, have not that permanence and steadiness characteristic of their nature in other parts of the world. The same with the equatorial currents: they seem to be neither permanent nor regular; at least, as far as regards those superficial portions with which the ordinary navigator has to deal. As is stated in the preliminary observations to this chapter, the great mass of waters may be moving in an opposite direction to that which the drift of a ship may indicate, as her immersion may not reach below that portion which may be immediately affected by the wind. What the extent of this action of the wind may be is difficult to estimate, but the movement occasioned by the surface waves does not reach to any very great depth—3, 4, or 5 fathoms at the utmost in ordinary cases; but, by accumulated impulses in one direction, a greater mass of water may be set in motion in that direction, and overlay a mass in a state of rest, or moving in another direction. There can be but little doubt but it is in this way that the absence of current, or partial reversing of their directions, may be accounted for. And also, that if more extended and careful observations were made upon the substrata of the ocean, it would be found that the waters of the Pacific are moving majestically in one unceasing circulation, regulated by one unvarying law. Therefore, as far as the surface of the ocean is concerned, the mariner may expect, but must not depend on finding, westerly currents within the tropical regions.

Capt. Duperrey, who has devoted much labour to the elucidation of the currents, places the southern limit of the equatorial current, beyond the influence of the continent, at latitude 26° S., and its northern border at latitude 24° N.,

or (partially) occupying a zone of 50° in breadth. It is more than probable that these latitudes may vary at the different seasons.

Commencing with the S.E. portion, it must be remarked, that the cold Peruvian current forms a portion of its initiatory course. This current, previously described, first assumes a direction to the West of North in about lat. 20° S., near the South American coast, and in lon. 108° W.; its southern limit, as evidenced by its low temperature, was found by M. Tesson to be in lat. $9^\circ 40'$ S., lon. 108° W.

It is probable that in this eastern portion the current may be less strongly marked than farther to the West. For Capt. Lütke states that he did not find any current in his passage between lat. 20° S. and lon. 81° W., and 28° and 116° W., a distance of 2,400 miles.*

Between Callao and Tahiti, after crossing the polar stream, Wilkes experienced little current. Among the islands of the Paumotu group none whatever was perceived, and the whole drift was no more than 17 miles in a N. 57° E. direction.

At the Marquesas it generally sets to the westward between N.N.W. and W.S.W., and its velocity is about half a mile an hour.

Concerning its velocity, Capt. Wilkes found it running to the S.E. at the rate of half a knot against the wind, in July, 1839, lat. $15^\circ 30'$ S., lon. $99^\circ 30'$ W.

At Disappointment Island, on the North of the Low Archipelago, the current ran to the West at a mile an hour.

To the South of Pitcairn Island it ran 34 miles a day to the *East* in a N.W. gale, January 9, 1837

In the southern part of the Low Archipelago, Capt. Beechey found it running strongly to the South.

Capt. Scott, of H.M.S. *Samarang*, estimates the current at Christmas Island (lat. $15^\circ 0'$ N., lon. $157^\circ 30'$ W.) to run 37 miles per day to S. 84° W., September 11, 1840. Proceeding to the N.W. on the following day, in lat. $2^\circ 30'$ N., lon. $158^\circ 50'$ W., S. 80° W. $11\frac{1}{2}$ miles; September 13, lat. $3^\circ 20'$ N., lon. $160^\circ 20'$, West 25 miles; September 14, lat. $4^\circ 10'$ N., lon. $161^\circ 40'$ (to the East of the Samarang Islands, then discovered), S. 45° W. 10 miles.

On September 16th Capt. Scott fell in with the easterly counter current presently described, which drifted him, in lat. $6^\circ 50'$, to N. 33° E., 50 miles in the twenty-four hours, but on the following day, in lat. $8^\circ 45'$ N., the equatorial current again set to S. 72° W., 25 miles per day.

Beyond the Feejee Islands, to the westward, a S.W. current prevails.—(Wilkes, vol. v. p. 472.)

* Berghaus places a *counter current* on his chart from the observations made on board the Prussian ship *Mentor*, October 20—26, 1823, on her passage from Coquimbo to the Sandwich Islands. The current she met with in crossing the tropic of Capricorn, that is, from lat. 26° to $21^\circ 30'$ S., lon. 75° to 82° W., was directly to the *East*—that is, opposed to the direction of the equatorial current. Whether this was only a partial and temporary stream, or whether it is due to some hitherto unexplained and constant cause, is not yet decided. The passages of Kotzebue and La Pérouse do not contradict, nor do the above remarks of Lütke, who traversed the space April 23 and 24, 1827, negative the existence, although the Russian commander does not add his testimony to the existence of the apparently well-defined Peruvian current. It has been placed on the charts alluded to as the *Mentor's counter drift*, though more observation is necessary to establish its existence. Should this be done, its name would be appropriate.

Between the Society and Navigators' Islands Wilkes considered that no current exists. The distance is about 2,000 miles, and in his passage, which occupied fourteen days, his drift only amounted to 43 miles, in a N. 9° W. direction. On approaching the latter group the temperature of the water rose a few degrees, indicating, as he surmises, that there was no cold submarine current.*

Around the Samoan group a current appeared to revolve; for on its southern side it set continually eastward, while on the northern side it set to the West. The current is weakest near the shores, and is not fully developed until at some distance from the islands. This phenomenon has little connexion with the tides, and does not appear to be connected with the general system; at least we are unable to account for it on general principles. A knowledge of its existence is, however, of importance to the navigator, as advantage may be taken of the easterly direction of that part to the South of the islands in beating to windward.†

After leaving the Feejee group, Wilkes did not experience any current until he reached the latitude of 8° South, and then only in separate impulses. He then experienced currents for three or four days, whose united effects amounted to no more than 20 or 30 miles, in a direction about South by West. In passing the Phoenix group a variable current was experienced, and little seems to exist there at the season when he passed it; but in the following January, when the *Peacock* was at this group, a current was found setting to the westward, which was lost on passing a degree or two to the South. In this voyage of the *Peacock* a space in the ocean was traversed remarkable for its elevated temperature, which was as high as 89°. The waters of this space, therefore, do not enter into the general circulation.

Approaching the western end of this southern equatorial current, that is, to the West of the Feejee Archipelago, we find that the currents vary considerably in their direction, and moreover are frequently very violent.

A portion of this has been called *Rossel's Drift*, to the N.W., off the New Hebrides, New Caledonia, &c. Berghaus has applied this name from its having been announced from the observations made in D'Entrecasteaux's voyage by Admiral Rossel. But it can scarcely deserve the name of a permanent current, as the following extracts will demonstrate.

On the eastern side of the reefs extending to the N.W. of New Caledonia, D'Urville found the current setting to the N.N.W., 34 miles a day, in June, 1827.

In the Nautical Magazine for 1842 are the following remarks:—"Off the islands, so far as my observation extends, the currents decrease in strength in proportion to the increase of latitude, that is, the nearer to the equator the stronger the current, and generally with the wind. There are, no doubt, many exceptions; but without an account of each island, which I am unable to give,

* Capt. Wilkes mentions cases in which the Polynesian Islands were occasionally affected by the remarkable phenomenon of a sudden rush of waters. He was inclined to ascribe this to the action of a polar current encountering obstructions at the several groups, as he considered that no other cause would be so likely to produce such results. The sides of the island which were most affected were those that would have been exposed to the full violence of a stream setting from a higher to a low latitude, while the action on the opposite side was rather much diminished or wholly insensible.

† Narrative of the United States' Exploring Expedition, vol. v. p. 472.

no statement can embrace all the particulars, yet one or two instances of such deviation may be mentioned. Cruising to the southward of New Georgia and the Bougainville Islands, throughout the S.E. monsoon from May until October, in the years 1836 and 1840, the current ran strongly to the S.E. against a strong wind and heavy swell, although at the same time, on the North side of these islands, it was running strongly to the westward. Off the North side of New Ireland, where a westerly current prevails, changes to the eastward occur for ten or twelve days at all seasons."

Between September and March westerly winds are regular at the Salomon Islands, and according to M. Dutailis, after they have set in, a very strong current runs invariably to the E.N.E. or N.N.E. between this archipelago and those of Santa Cruz, Mendaña, &c., sometimes at the rate of 40 miles per day.

Capt. Le Mignon, whose remarks have been given on page 1002, found the current, in April, 1846, between Mitre Island and San Christoval to run at the rate of 24 or 25 miles a day to the *East*. To the South of the Salomon Islands they ran to the South 45 miles a day, and also 30 to 45 miles to the East. The weather, it should be stated, was very bad, and the winds violent and irregular.

D'Urville found the currents very violent in his approach to New Britain and on the North side of New Guinea. To the N.E. of the eastern extremity of the Louisiade Archipelago they ran to the North 30 miles per day. Farther North, between this and St. George's Channel, between New Ireland and New Britain, he found it set 36 miles a day to the N.W. $\frac{1}{4}$ N., and near that strait he was set 60 miles to *South* and 30 miles to the West in two days.—(D'Urville, vol. iv. pp. 487—524.)

When he sailed along the North coast of New Guinea he found the current setting strongly to the westward, at one period, about lon. 142° E., at the rate of 58 miles in forty-eight hours.—(Vol. iv. p. 557.)

Between the Feejee Islands and the New Hebrides D'Urville found the current setting to the West 40 miles per day throughout his passage.

Between New Zealand and Tonga, Wilkes found the currents variable; their general effect was a drift of 108 miles, in a direction S. 88° W. On this route he passed the Kermadec Islands, and through the latitudes where the southern polar streams appear to be lost.

The NORTHERN EQUATORIAL CURRENT, which, according to Duperrey's conclusions, extends to the mean latitude of 24° N., is also subject to the variations experienced in the southern portion of this extensive drift.

In its eastern portion there is no well-marked origin, as is the case in the Peruvian current flowing to the N.W. and westward at the Galapagos Islands. On the contrary, as is elsewhere remarked, the Mexican coast currents are comparatively weak and undecided, so that there is some source from whence the westward tendency of the ocean is derived, beyond the apparent effects of the trade-wind and the action of the sun's heat.

In a former part of this chapter we alluded to the general notions on the cause and nature of the origin of currents. Whether it is the effect of heat, or from the continued action of the trade-winds, one fact seems to be tolerably well determined, and that is, in the circulation of the oceanic waters around their

respective basins, the greatest velocity or force of the currents is at their *outer* limits; this force gradually diminishes within the area, and leaves a space not acted on by the circulatory movement, and which area, by analogy, we should expect to find of a higher temperature than might be calculated on if the polar streams should not add their lowering influence. This theory is argued out by M. Babinet from the basis of Duperrey's chart of the currents.* Following this theory, we must expect to find them in greatest force nearer the equator, a fact apparently established. And in the central portion of the North Pacific there does not appear to be any regularity of the set of the waters, and the limit assigned by Duperrey may even be too high, as the Sandwich Islands, in lat. 20°, do not appear to be surrounded by any permanent current.

The following remark by Capt. Wilkes is confirmatory of this :—"After passing the parallel of 10° N. we began to feel the effects of the current that is ascribed to the influence of the trade-winds, and this continued without much diminution of strength until we lost the trades in lat. 19° N. The drift of this current was 271 miles in a direction S. 71° W."—(Vol. v. p. 476.)

Capt. Wilkes continues :—"At the Sandwich Islands I am not disposed to think, from any observations I had an opportunity of making, that there are any regular currents, or any set of the waters, except what is caused by the winds. There is, in fact, rarely any difficulty in beating to windward; the time of passing between the islands is about the same at all seasons of the year; and I found none in beating up to my port in any reasonable time after falling to leeward of it. Their position is assimilated to St. Helena. The temperature of the waters around these islands is about the same as that which prevails in the ocean in the neighbourhood, a fact which I consider to be a proof that no polar current reaches them." The circumstance of pine timber being drifted on to the East end of Atooi, as noticed on page 1124 (part ii.), would almost prove, beyond a doubt, that the currents were at times to the S.E. from the coast of America, where the timber apparently came from; but another circumstance, equally conclusive in an opposite direction, is the drift of a Japanese junk, as related presently.

Our observations on the set of the waters to the West of this, between lat. 10° and 20° N., need be but few. That westerly currents are those prevalent is undoubted; but their northern limits, or velocity and regularity, do not appear to be well known.

Kotzebue, when he first saw the Marshall Islands in 1817, intended to have examined them, but he was drifted through them by so strong a current to the West, that he could not recover his position.

The currents at the Marianas are also subject to great variations. Capt. Golownin met with a rapid current, bearing to the N.E., though the wind blew from that quarter, and a Spanish officer affirms that a similar current generally flows at this part. It is probable that the westerly monsoon, which is felt at the Marianas, from the middle of June to the middle of October, according to Freycinet, may cause a reversion of the usual current.

Capt. Marchand, in *La Solide*, when to the eastward of Tinian, lon. 148° 14',

* See *Comptes Rendus*, tome xxviii. p. 749; and *Edin. New Phil. Journ.*, 1850, pp. 160—166.

to $148^{\circ} 34'$, calculated that he had been set 41.6 miles to the eastward in forty-eight hours; this was on November 2—4, 1791.—(Fleurieu's *Voyage of Marchand*, vol. ii. p. 420.)

The American Expedition found the currents strong to the northward and westward, to the N.E. of the Mariana Islands.—(Vol. v. p. 268.)

The parallel of 30° N. is a favourite one with the whalers, as Capt. Beechey states (vol. i. p. 236), and it is hereabout that we might look for that line of demarcation which separates the easterly and north-easterly drift of the ocean waters, occasioned by the trade-winds. According to Capt. Wilkes, great quantities of *janthina*, the soft mollusc of which serves as food for the whale, were found on the verge of the trade, in lat. 26° N., lon. 168° W., the trade having failed a degree to the southward. Again, when the Expedition was in about lat. 30° N., lon. 180° , vast quantities of *anatifa*, another mollusc, were found to lie in a W.S.W. and E.N.E. direction.—(Vol. v. p. 109.) This arrangement of their locality would certainly appear to indicate some combined influence of current. The temperature of the adjacent water is not stated, but it is probable that some variation would have been found to the northward and southward of this line of zoophytes. We have not materials wherewith to pursue this subject further: nor have we any distinct notion of the set of the currents, if any, to the westward of the Marianas. But it is certain that the equatorial current reappears in the form of a warm N.E. current to the South of the Japanese Archipelago, the progress of which will be presently traced.

5. THE EQUATORIAL COUNTER CURRENT.

In our general remarks on the winds on page 1172, it is said that in the aerial systems of the Pacific, as elsewhere, there was a space between the two great belts called the N.E. and S.E. trade-winds, in which the wind was variable and light, and in which calms and rains prevailed. This zone of *variable* winds, as they are known, is affected, in their breadth and latitude, by the annual progress of the sun in the ecliptic.

In the current systems we have a precisely analogous phenomenon—that of a body of water moving with more or less regularity to the *eastward*, bounded to the North and South by currents moving in the opposite direction. This counter current has been traced, with considerable certainty, nearly across the entire breadth of the Pacific; and the ensuing extracts will explain its character. The first is the observation made by Capt. Lütke, in his traverse in the *Séniavine*.

After crossing the parallel of 30° , in lon. 81° , we had for forty-eight hours, and during light winds and calms, a weak current between North and N.W.; and then for a fortnight, from lat. 28° S., and lon. 116° , that is, for a space of 2,400 Italian miles, we scarcely felt any current at all. In lat. 26° we had a S.E. wind, which passed insensibly to the condition of a true trade-wind, and which even sometimes blew freshly, but all this did not produce any current; during two or three different days, we had a weak current to the West, following the wind, and for as many days returning against the wind. In the course of this fortnight the difference between the estimated longitude and that by the chronometer did not exceed $20'$, and there was none in latitude.

Between lat. 10° and 2° S., there was for four days, during which the trade-wind, without blowing strongly, was constant and equal, a tolerably strong westerly current, the mean velocity of which to the W. by N. was 17 miles in twenty-four hours.

In lat. 2° S. the trade-wind left us, and the current shifted also to the East, then to N.E., and again to S.E., but more to this last quarter as far as 8° or 10° North latitude, where the N.E. trade stopped it. The mean effect of this current was E. 6° S. $12\frac{1}{2}$ miles in twenty-four hours.

For the sixteen days that the current just spoken of lasted, there were but two which showed any exception, but to compensate they were very striking; this was between lat. 1° and 4° N., where the currents drifted us, in forty-eight hours, 75 miles directly to the N.W., in extremely light airs between East and S.E., and sometimes during almost an entire calm.

This easterly current could here be attributed to light, variable winds coming from the western quarter, but the same thing occurred in the neighbourhood of the Caroline Islands, when the N.E. trade-wind blew constantly, and sometimes with considerable strength. In approaching the Island of *Ualan* we found a S.E. current in lat. 8° , and lon. 163° E. To the West of this meridian the easterly current did not extend toward the North beyond the parallel of 7° , and toward the South, in general, beyond that of $5\frac{1}{2}^{\circ}$. Between these parallels, and as far as lon. 152° E., in the course of more than three weeks (in January), we did not once have westerly currents, but always to the East, inclining to the South in the eastern moiety of this space, and more to the North in the western gulf. There was no exception to this order, except between the *Séniavine Islands*, where the neighbourhood of the coasts and the action of the tides might easily interrupt the regularity of the usual currents. Its mean effect, during these three weeks, was 8.3 miles in the twenty-four hours to the E. by N.

We had no sooner passed to the North of the parallel of $6\frac{1}{2}^{\circ}$, lon. 152° E., than we got into a strong current to the West, which did not leave us afterwards. To the West of 152° E. we did not get but once to the South of the parallel of 7° (from the 9th to the 12th of April, in lon. 144° E.), and we also found the current inclining to the East. To the South of the parallel of 5° , on the meridian of the Island of *Ualan*, the current bore chiefly to S.W., but then once, in lat. 3° , the current was to the East 13 miles in twenty-four hours.

A zone of easterly currents, between the constant westerly currents, as well in the western as in the eastern part of the Pacific, has also been noticed by other navigators. Capts. *Hunter* and *Wilson* found it more to the South than we did, in the limits of the Caroline Archipelago; Capt. *Duperrey*, between lat. 2° and 6° North, and 7° to 10° E. of *Ualan*, had currents to the S.E. and N.E., but, on approaching this last island, they were still more to the S.W.; again, between the equator and $8\frac{1}{2}^{\circ}$ N., and lon. 148° E. and 137° E., he re-found the easterly currents. Admiral *Krusenstern* places the limits of this East current, meridionally, at the equator, and the parallel of 6° ;* from our experience, these limits are 5° and 7° , although in lon. 163° E. we had already met with them. Capt. *Freycinet* found strong East currents between the latitudes of $9^{\circ} 20'$ and 4° N.,

* *Memoires sur la Mer du Sud*, part i. p. xv.

and lon. 149° and 144° W. Capt. Beechey, in his route from the Society Isles to the Sandwich Isles, found between the equator and 4° N., where he got into the N.E. trade-wind, a N.N.E. current, the mean activity of which was 18 miles in twenty-four hours. Capt. Wendt, in the Prussian merchant-ship *Princesse Louise*, found in three different years, between the parallels of $6^{\circ} 30'$ N. and $10^{\circ} 30'$ N., and lon. 125° and 131° W., currents from the N.E. quarter, of a velocity of from 17 to 25 miles. From all appearances, these easterly currents have some connexion with each other; but we do not yet possess a sufficiently large number of facts from which to deduce a general view of the subjects.

To the North of this eastern current, within the limits of the easterly winds, we always found a constant current to the West, inclining in some parts towards the North, in others to the South. Between the parallels of 7° and 9° , where we passed, at different times, more than a month, the currents constantly bore away between W.S.W. and W. by S. In the months of February and March, between lon. 152° and 146° , their mean force was, in eleven days, of 15 miles in twenty-four hours, to S. 83° W.; between lon. 147° and 144° , in the same interval of time, of 8 miles to S. 71° W. In November and December, between lon. 156° and 140° , in sixteen days, of 14.4 miles in twenty-four hours, to S. 79° W. Farther on, towards the West, in our route to the China Sea, we experienced nearly the same currents, their direction and force being in general 16 miles in twenty-four hours, to S. 70° W.

To the North of lat. 9° , the currents inclined more to the West of North. In the eastern half of the Pacific (between lon. 130° and 146° , from lat. 10° to 30°) we found their general direction to be N. 86° W., and their force 11.7 miles in twenty-four hours. In the western half, on our route to the Island of *Guahan*, their general direction, in the interval of four days, was found to be N. 75° W., 22 miles in twenty-four hours; and on our return from the Caroline Archipelago, under the same apparent circumstances, and in the same interval, S. 49° W., 22 miles in twenty-four hours. In leaving the Carolines, in April, as far as lat. 22° , where the trade-winds left us (from lon. 143° to 139° E.), we had constant westerly currents, the general action of which, in ten days, was N. 52° W., 18.3 miles in twenty-four hours; and in returning from the North to this archipelago, in November, we had these N.W. currents for the greater part of the time, up to the period of our meeting with the trade-winds, in lat. 26° (lon. 199° to 204°); and we found their mean rate, in nine days, to be 14.7 miles in twenty-four hours, to N. 69° W. On the meridian of the Island of *Ualan*, on the contrary, as far as the parallel of 28° , also in November, the general direction of the current was S. 43° W., 18 miles in twenty-four hours.

We did not observe that the direction or strength of the trade-winds determined the direction of the current to the North or South of West. These different inclinations occurred with winds perfectly the same; we must, therefore, rather seek the reason in some local circumstances if they should not proceed from some general and permanent cause, and are not an accidental phenomenon, changing without order.*

* Voyage du *Sénarvins*, Partie Nautique, p. 182.

A correspondent of the *Nautical Magazine* also speaks of this reverse current :—In July, 1833, on the equator, in lon. 175° E., a current of about 2 or 3 knots an hour ran to the eastward for fourteen or fifteen days, although the wind was then fresh from the eastward ; and it was thought that such changes have generally occurred once a year, probably induced by a strong S.W. or westerly monsoon in North latitude, reaching at this time near the line. They are fitful changes, and not to be depended on, nor can their extent to the eastward be stated.—(*Nautical Magazine*, January, 1843, p. 5.)

What is here stated respecting the S.W. wind extending so far to the northward, is confirmatory of what is advanced by Capt. Cook, as given on page 1202.

The current generally on the equator, or from 1° or 2° N. to about 3° S., according to the same observer, runs to the westward about 2 or 3 knots, taking its course from the wind. But from other remarks it seldom reaches such a velocity.

Capt. Wilkes says the current sets through the eastern range of the Feejee Islands to the N.E., as observed by the *Porpoise*, during her survey of that part of the group, and as shown by the manner in which the casks of the whale-ship *Skylock*, wrecked on Turtle Island, were carried to Fulanga, where they were picked up. We also experienced the same current in the drift it caused on the first night of our arrival off these islands. A strong current also sets to the eastward, on the southern side of the Feejee group. I felt convinced that the currents here arose from cold submarine streams as a cause, and my views were corroborated by the fact that the *Peacock*, on her voyage from Sydney to Tongatabu, had been affected by northerly currents.—(Vol. v. p. 475).

Capt. Wilkes continues :—“ On our route to the northward we crossed a stream setting to the westward, which extends as far West as the Kingsmill group, between lat. 2° S. and 3° N., after leaving which we encountered another, setting with equal velocity to the East, between lat. 4° and 9° N. This last tropical counter current was traced by us between the same parallel nearly across the Pacific, from the lon. of 170° E. to the lon. of 138° W. We had no opportunity of ascertaining ourselves whether it exists to the westward of the Mulgrave Islands ; but Horsburgh, and several other authorities, mention the prevalence of an easterly current as far to the West as the Sea of Celebes, and particularly in lat. 4° N.”—(Vol. v. p. 476).

At the Gilbert Archipelago, during violent gales from S.W., which prevail from October to April, trunks of large trees are thrown upon the West sides of the islands, together with large lumps of resin, similar to that found in the soil of New Zealand.

Capt. Bristow found the current strong from West to East at the Purdy Islets, in February and March, 1817.

We shall conclude with these remarks by Admiral Krusenstern :—

“ This current, bearing from West to East, forms to the North of the equator a zone which extends to the 6th degree of latitude, and the velocity of which is frequently 20 leagues in the twenty-four hours. Ships returning from China in the opposite season, that is, during the S.W. monsoon, and proceeding by the Pacific Ocean towards the Strait of Gamen, do not generally go farther toward the East than the Pelew Isles ; but if they do not pay great attention to this

current, they will usually be carried several degrees toward the East. The best means of avoiding this stream of current is to attempt to cross it as quickly as possible from North to South, because South of the equator the S.E. trade is met with, accompanied by a current bearing to the West, the rate of which, near the coast of New Guinea, is from 15 to 40 miles in the twenty-four hours, in a West and W.N.W. direction."

These observations will demonstrate that between lat. 4° and 10° N., which limits may be subject to some fluctuation, there is a current running to the eastward, or against the usual course of the inter-tropical winds and the drift of the ocean on either side of it, and extending from the western extremity of the Pacific as far as lon. 115° W., and perhaps beyond this, if the Peruvian cold current should not extend beyond that latitude in this meridian.

6. THE AUSTRALIAN CURRENT.

In the northern part of the equatorial current in the North Pacific we have shown that when it reaches the neighbourhood of the continent West of the Marianes it turns to the northward and eastward, forming the well-defined Japanese current—the gulf-stream of the North Pacific.

We have a somewhat similar arrangement of current on the southern edge of the South equatorial stream, which, as has been previously stated, striking the coasts of New Caledonia, the New Hebrides, &c., trends away to the N.W.; so, in like manner, the portion South of this reaching the Australian coast, is deflected and runs to the southward, a warm stream, off the coast of Australia. This course it pursues until it encounters the cold antarctic drift to the N.E., which thus again deflects it and becomes incorporated with it. The first remarks bearing on this current we give from Admiral Krusenstern's treatise:—

Although the winds blow throughout the year either from S.E. or S.W., the current constantly runs to the South, with a velocity of 1 or 2 miles an hour, at the distance of from 4 to 20 leagues from land. Beyond these limits there is no current found, and very close to the land, particularly in the bays, we have a current to the North, but which does not exceed a quarter, or at most a mile, an hour. At the S.E. and southern part of Australia the current is very violent, and bears to the South, and near Cape Howe its direction draws more towards the East. In ranging along this part of the coast to go to the southward, it would be well to keep at the distance of 40 or 50 miles from land, because you will then be sufficiently far from the land not to fear the gales of wind from seaward which will be met with in the course of the current which runs to the South. On the contrary, if a vessel is making way for the North, she ought not to leave the coast more than 10 miles; but this navigation demands much caution, to guard against gales from seaward. The barometer will then be the best guide; the mercury rises on this part of the coast with S.E. winds, and falls with those from N.W.; N.E. or S.W. winds do not equally influence the barometer.

Lieutenant Jeffries, R.N., who has navigated a great deal on the East coast of Australia, and who has filled up the blanks left by Cook and Flinders in the geography of this part of the globe, has made some observations on the currents

in this neighbourhood which do not entirely accord with those of Capt. Flinders. According to Jeffries, the currents, from lat. 28° to the southern part of Van Diemen's Land, during summer, that is, from August or September until April or May, run to S. by W. with a rate of $1\frac{1}{2}$ miles; always provided that the distance from the coast does not exceed 7 leagues: if it is greater than this, and as far as 20 leagues off, they run to N. by W. with a rate of $3\frac{1}{2}$ miles an hour. In winter the opposite of what has been just stated takes place.

To the North of the tropic to the opening of Torres Strait, and within the coral banks, the Barrier Reefs, there is not any current, nor any ebbing or flowing, to be observed. Outside the Barrier Reefs the currents are generally regulated by the prevailing winds.*

Capt. Sir James Ross, immediately on coming out of the heads of Port Jackson, found the temperature of the air to rise from 55° to 60° , and the surface of the sea from 55° to 63° , a temperature it maintained during his progress to the eastward toward New Zealand. During the first twenty-four hours they had run 160 miles, and were set 29 miles to the South of their reckoning.—August 5, 1841.

This belt does not exceed 300 miles in breadth; beyond, or to the East of which, the current sets to the northward 10 miles per day.†

On March 3rd, the United States' ship *Peacock* left Sydney, and passed the heads of Port Jackson on the same afternoon. When about 70 miles from the coast, in lat. $33\frac{1}{2}^{\circ}$ S., they experienced a change of 4° in the temperature of the sea; and on April 3rd they found they had been set 30 miles to the southward during the day. On the 5th, the temperature again fell to 72° , with an easterly current. Several English vessels were seen cruising for whales, in lat. 28° S., lon. 157° E. The winds continued contrary and light. On the 9th, in lat. 26° S., lon. 159° E., an opportunity occurred for trying the deep sea temperature. At 830 fathoms below the surface, the temperature had decreased to 46° , that of the surface being 76° ; and the current was found setting East by South, half a mile per hour. The next day, in lat. $25^{\circ} 40'$ S., lon. 160° E., the experiments were repeated: the surface water was 75° ; at 100 fathoms, 73° ; at 300 fathoms, 56° ; and at 500 fathoms, 49° . The current was now found setting to the S.S.W., at the rate of half a mile per hour.‡

Capt. Wilkes, in his remarks on the currents, also has the following:—

Before making the coast of New South Wales, the temperature of the water rose to 73° , and on a subsequent occasion to 75° , and we experienced the effects of a stream that sets to the southward parallel to the coast of New South Wales. This current, like the Gulf Stream, is variable in breadth and strength, and at certain seasons of the year runs with great rapidity. The occurrence of this stream renders it advisable that vessels bound to Sydney should make their landfall to the northward of the harbour. There is no difficulty in tracing the connexion of this stream with that which we found setting to the S.W. near the Feejee group, which being thrown towards the coast of New South Wales by the South Polar Stream that meets its course obliquely, it also receives an accession

* Flinders' Voyage, vol. ii. pp. 282—286. † Voyage to Southern Seas, &c., vol. ii. p. 49.
‡ Narrative of the United States' Exploring Expedition, vol. iii. p. 37.

of strength from the waters that flow to the S.W. on the West side of New Guinea ; ample proof of such a current is to be found in the difficulty of passing to the eastward of the Barrier Reefs. This stream is analagous to our Gulf Stream, although much less remarkable, and is at times found to extend to the South of Van Diemen's Land, the distance to which it prevails depending on the strength of the polar current which opposes it. Thus the French frigate *La Venus* met this stream to the South and East of Van Diemen's Land in the month of January, 1839, and was more than thirty-six hours in passing through it. It more frequently turns into Bass's Straits, after which it is lost in the sea to the West of Van Diemen's Land, or mingles with the Polar Current.*

There is one other current alluded to in the last paragraph which requires better acquaintance and more extended observations ere we can pronounce upon its real character. It is a *warm* current, setting to the eastward around the South extremity of Van Diemen's Land. It was first observed on board the French frigate *La Venus*, under Du Petit Thouars, January 6—9, 1839. It was not very strong, scarcely exceeding 15 miles in twenty-four hours to the East and E.S.E. M. Tessan, after enumerating the currents as yet known, says:—Has not the *Venus* discovered a fourth of these currents to the S.S.E. of Van Diemen's Land? It is certain that between the 6th and 9th of January, 1839, and particularly the 7th and 8th, the frigate crossed a warm stream. Has this river the permanence of the three other currents, the Gulf Stream, the Agulhas Current, and the relatively warm Cape Horn Current?

				Temp. (Fabr.)	
January 6, 1839	....	lat. 45 56 S.	....	noon	51·6
		lon. 148 50 E.		midn.	49·0
				noon	50·4
January 7, 1839	....	lat. 45 16 S.	....	6 p.m.	57·2
		lon. 148 20 E.		midn.	56·9
				6 a.m.	55·4
January 8, 1839	....	lat. 44 30 S.	....	noon	53·6
		lon. 146 39 E.		6 p.m.	56·0
				midn.	54·5
January 9, 1839	....	lat. 46 3 S.	....	noon	52·4
		lon. 147 36 E.		6 p.m.	49·0
				midn.	49·0
				6 a.m.	50·4
				noon	50·0 †

It will lead us too far from our subject to pursue this further. What the origin or ultimate progress of the current may be is involved at present in some obscurity. It is sufficient to mention it here.

We shall now add a few remarks on the connecting currents which are found between Australia and New Zealand.

* Narrative of the United States' Exploring Expedition, vol. v. p. 472.

† Voyage de *La Venus*, tome iii. pp. 437-8.

In other portions of the world recent experiments have shown that a system of revolution is going on in the separate basins into which the ocean is divided; where the land bounds any expanse of water in several directions, the tides and currents circulate around its borders, leaving the central space comparatively or perfectly free from their action. This notion was perhaps first distinctly enunciated by Professor Whewell, as to the North Sea tides, and confirmed by Capt. Hewett. As we shall have occasion to advert to presently, a similar basin is to be found, though on a very much more magnificent scale, in the circulating currents of the North Pacific.

In the space between Australia and New Zealand, the same operation is going on. To the westward is the southerly warm current just described. To the South this warm current is pressed upward by the northerly cold antarctic current. On the New Zealand coast this current is felt as far to the northward as Cook's Strait, while to the northward of the islands the warm equatorial and the cool polar currents by turns gain ascendancy. This system develops one feature, that of a central space in which no current (except those dependent on the wind) is to be found. It is called by the whalemens the *middle ground*, and has been exceedingly productive to the New Zealand and Australian whale fishery. Its physical character we must suppose to be favourable to the production of the food of the whale, which perhaps flourishes here undisturbed by the transporting influence of currents unequalizing the temperature, and occasioning different water climates, so to speak, in the same locality. It is probable that the whales frequenting this middle ground came, or rather have come, to the shores of New Zealand, N.W. of Cook's Strait, to calve, in the bight called by the whalers Northerly Bay. However, it is most probable that the navigator, by availing himself of the various set of the currents, which will be elucidated by this theory, may greatly assist his passage across this part of the ocean.

We will cite some remarks that have been made on it.

Wilkes found, on approaching Lord Howe's Island and Ball's Pyramid from the Samoan Islands, a current setting North, in which direction his drift in the passage was 120 miles. In the neighbourhood of the first-named island the temperature fell to 66°, but on nearing the coast of Australia the warm southerly current raised it to 73°.—(Vol. v. p. 472.)

Capt. FitzRoy says :—On New Year's day, while in sight of the islets called Three Kings, we passed through several tide "races," one of which was rather "heavy," and would have been impassable for a boat. These races moved towards the North, while we could trace their progress. The temperature of the water fell 6° after passing through the principal one. Next day at noon we found that during the past twenty-four hours we had been set as many miles southward (S.S.E.); and hence I am inclined to infer that we were influenced by regular tide streams, rather than by currents setting always in one direction. To the succeeding day at noon (3rd) we were set only 7 miles by water, and that due East. Afterwards, in our passage to Port Jackson, we had alternately northerly and south-easterly currents of about 10 miles a day, and it was easy to tell which current we were in by the temperature of the sea: while the stream set from the North, the water thermometer showed about 72°; but when the current was

running from the southward, the temperature of the ocean, a foot below as well as at the surface, was only 67°.*

D'Urville considered that Cook's Straits, the separation between the two larger islands, had been formed by the constant drift of the ocean to the S.E. (caused by the permanent N.W. winds) making a free passage through the group.

Though not immediately connected with the system just described, the following brief remarks may be given here respecting the currents around New Zealand. Wilkes considered that the antarctic drift strikes the southern part of the islands and forms currents on either side of the range, which, however, are not constant. That branch which flows on the western side appeared to be the strongest, and is felt as far to the North as Cook's Straits. The current which flows on the eastern side forms an eddy to the North of the islands.—(Vol. v. p. 473.)

Capt. Newby, sailing eastward from Cook's Straits in August, 1849, when on the meridian of the Chatham Islands, fell in with much tangle and sea-weed; this would indicate the northerly (polar) current before spoken of.

We shall now pass to the corresponding current to that flowing from the northward along the Australian coast, and becomes less in the cold polar current, to the corresponding stream in the northern hemisphere, which, it will be seen, is much more distinctly characterized, leaving all the minor features, or supposed distinct currents, to be adverted to hereafter.

7. THE JAPANESE CURRENT.

The movements of the waters, as well as of the atmosphere, seem to be on a more limited scale, and less decidedly marked, in the northern Pacific than they are in the southern hemisphere. This is probably owing to its comparatively enclosed character. From this cause it deserves, in some degree, the title of Pacific, and its navigation is not attended with any difficulty, as any ordinary ship may, with perseverance, work to windward in its central portion.

But towards its western side the movement of the ocean becomes manifest, and we find a great analogy in this respect to that of the North Atlantic, and accordingly, a very distinctly characterized current in the Pacific follows a parallel course to that of the Gulf Stream, well known in the Atlantic.

From the different configuration of the land, however, the absence of any western barrier, such as the Mexican coast presents to the western progress of the Atlantic waters, and the contraction of its channel by the Bahama Islands, this Pacific Gulf Stream has not such a distinct character as is seen in the Gulf of Florida. Still this warm ocean-river may be traced in its course by observation and analogy around the northern side of the North Pacific.

This current, in the earlier part of its course, has been noticed by several navigators, especially Capts. King, Krusenstern, and Broughton, whose remarks will be given presently.

The first point which may be noticed in it is the authority of the Japanese charts. On all of them, as shown by Siebold and Krusenstern, between Fatsisio

* Voyage of the *Beagle*, vol. ii. p. 620.

and the Mokiera Islands, that is, off the S.E. part of Nippon, South of Jedo, the capital, a current to the *eastward* is marked, called the *Kuro Sirvo Stream*, or as Krusenstern calls it, *Kourosegawa*, or the *Current of the Black Gulf*. The latter adds this remark :—"This current is 20 matsi (five-ninths of a Japanese ri, that is, about three-quarters of a mile) broad. For 10 matsi it has a very rapid course. In winter and spring it is very difficult to navigate, but in summer and autumn vessels can pass it." Of the exact velocity that this may be no account is given, but it is clear that it must be great, perhaps increased by passing through a contracted channel. It is important to notice it, and have such evidence in the early portion of its course.

Capt. Gore, after the deaths of Capts. Cook and Clerke, returned from the northward in the *Resolution*, making the coast of Japan in the beginning of November, 1779. Capt. King states, that, in this passage, when they approached the S.E. part of Japan, they were drifted by a strong current from the S.W., and that when they reached the latitude of $35^{\circ} 43'$, in eight hours, instead of making a course of 9 leagues to the S.W., they had been carried 8 leagues from the position they had left in a diametrically opposite direction, giving a velocity and direction to the current of at least *four miles* an hour to the N.E. by N., the longitude being $141^{\circ} 16'$. Capt. King makes the following comments on this:—As the strong currents which set along the eastern coast of Japan may be of dangerous consequence to the navigator who is not aware of their extraordinary rapidity, I shall take leave of this island with a summary account of their form and direction, as observed at from the 1st to the 8th of November. On the 1st, at which time we were about 18 leagues to the eastward of White Point, the current set N.E. by N., at the rate of 3 miles an hour; on the 2nd, as we approached the shore, we found it continuing in the same direction, but increased in its rapidity to 5 miles an hour; as we left the shore it again became more moderate, and inclined to the eastward; on the 3rd, at the distance of 60 leagues, it set to the E.N.E., 3 miles an hour; on the 4th and 5th, it turned to the southward, and at 120 leagues from the land its direction was S.E., and its rate not more than $1\frac{1}{2}$ miles an hour; on the 6th and 7th it again shifted round to the N.E.; its force gradually diminishing till the 8th, when we could no longer perceive any at all.* This calculation would make it about 250 miles broad off this part of the Japanese coast.

The next authority we shall quote for it is Admiral Krusenstern, who, as is well known, passed to the eastward of the islands, September, 1804. From the introductory portion of his great work we extract the following :—

The currents constantly run to the N.E. From the Strait of Sangar, as far as the parallel of $36\frac{1}{2}^{\circ}$, we had daily a current, which carried us N.E. $\frac{1}{4}$ E., at the rate of 10 miles in the twenty-four hours. From the latitude of 36° to $35\frac{1}{2}^{\circ}$, being about 70 leagues from land, it bore towards the E.N.E., with a velocity of 2 miles an hour. From the parallel of $35\frac{1}{2}^{\circ}$ to $34\frac{1}{2}^{\circ}$ the current bore to N.E. $\frac{1}{4}$ N., $1\frac{1}{2}$ miles an hour; we were then 60 leagues from land. Traversing the islands lying to the South of the Gulf of Jedo, we felt a current bearing to

* Cook's Last Voyage, vol. iii. pp. 404-5.

S.W., with a velocity of nearly a mile an hour; but after having passed these islands some degrees to the West, we again met with the former current bearing to the N.E.

When we discovered the coast of Japan upon the parallel of 31° , and particularly the southern part of the Isle Sikokf, the current carried us to the N.E., $3\frac{1}{4}$ miles an hour. Capt. Broughton ranged near the eastern coast of Japan during the months of November and July. We see by his journal that he constantly felt a current which carried him to the N.E., at 2 miles an hour, with this difference, nevertheless, that during the month of November the current bore more toward the North, and in July more to the East, but always between these two directions. We can conclude from the foregoing, that the currents upon the eastern coast of Japan are subjected to fixed laws, at least during the months of July, September, and October, and that their strength and force depend on the distance where they are met with from the coast. Capt. Colnett passed along the coast in March and April; it would be interesting to know what direction the currents then had, because a perfect knowledge of the currents in each season infinitely facilitates the navigation between Kamtschatka and Japan.

Thus far the definition of the Japanese current rests on positive evidence of unexceptionable character, as far as regards the seasons in which they were made. But its effects may be traced to the northward and westward.

It reaches the coast of Kamtschatka. Du Petit Thouars notices the mildness of the climate in the vicinity of Awatska Bay, and attributes it to the warm (Japanese) current coming from the south-westward, and thus ameliorates the severity of the winter. The comparative freedom from ice of the bays and inlets is also another evidence of its influence. The universal fogs which prevail, too, in the vicinity of the islands in the western portion of the Sea of Behring, arising, as is most probable, from the difference of temperature between the air and water, also indicates the same fact, and is perhaps analogous to the same phenomenon on the Banks of Newfoundland, arising from the Gulf Stream.

On page 603 (part i. of this work) the destruction of a Japanese junk is noticed. This occurred near the South end of the Kamtschatkan Peninsula in July, 1729. It was proceeding to the Port of Ohosaka in the South of Japan, and was drifted away by a violent storm to the N.E., and at last reached the place alluded to. This also is corroborated.

Another and similar circumstance is quoted on page 1124 (part ii.), of a Japanese junk which had drifted from its destination, and anchored, in December, 1832, at Oahu, Sandwich Islands. Although the currents in the vicinity of this group do not seem to be very well defined in their character, and we shall adduce one of an opposite nature, this circumstance must also be considered as an evidence of the easterly drift from Japan.

But we may look still farther to the East. A Japanese junk was wrecked near Cape Flattery, in Oregon, in 1833, as described on page 372 (part i.). This last is detailed by Washington Irving, in his "Astoria." These singular occurrences at once attest the tendency of the currents, and open a wide field for discussion on the migration of the inhabitants of eastern Asia and the peopling of the western world.

As an intermediate point where we may look for indirect evidence of the progress of this stream, the South extremity of Kodiack Island may be adduced. Here the remains of Japanese wrecks, recognised by the camphor-wood used in them, and other Japanese articles are found. We have no direct experiments recorded of the force or prevalence of the current to the South of the Aleutian Islands, but it may be supposed, from what has been said, to trend to the eastward towards the coast of N.W. America, and then assume a more southerly direction. This theory is confirmed by the ensuing remarks by Commander Wilkes, of the United States' Exploring Expedition:—Our passage from the Hawaiian group to the N.W. coast gave interesting results in relation to the currents. They were irregular until we reached the latitude of 27° N., after which we were strongly affected by a S.E. current, whose influence continued until we reached the coast of Oregon. At this time it ran at the rate of 50 miles in twenty-four hours; but when the *Peacock* traversed this same space, ninety days later, the velocity had not only diminished, but what current was found was nearly in an opposite direction. In relation to the extent of this S.E. current in the months of March and April, I have no precise information, nor can I supply it from others, since those who had previously visited this part of the ocean had not paid sufficient attention to this subject to furnish any precise data. All, however, agree in the fact, that they were affected by a S.E. current, often reaching the longitude of 130° W., and the latitude of 35° N.

We may conclude our remarks on this part of the ocean with the observations of Admiral Lütke, whose scientific character and ample means command all confidence:—

In the same way that the constant West current within the limit of the N.E. trade-winds is explained by the constant easterly winds, so beyond this limit we met with such currents as the prevalent wind would afford an explanation. We met with but one exception to this rule. In the three traverses to the South of Kamtschatka and back again, between lat. 30° and 40° to 45° , and lon. 162° and 146° , we found, even with easterly winds, currents to the East. In our route from the Bonin-sima Islands to Kamtschatka, in May, 1828, we felt the first effect of this current, in lat. $33^{\circ} 42'$, where in two days it carried us 74 miles to the N.E., in calms and extremely light S.E. winds. From thence, in lat. 45° , we had for ten days, with only two exceptions, always currents to the East, although during all this time the wind was between S.E. and N.E., and that they blew sometimes very freshly. The mean action in this interval was 15 miles in twenty-four hours to N. 47° E. The current, after that, bore even more to S.E., but then during fresh winds from N.W. In the route from Kamtschatka to Ualan, in October and November, we found the first S.E. current in lat. 38° during S.E. winds; the currents towards the East quarter kept up for eight days, and the strongest occurred this time too in about lat. 34° , when we were drifted, in twenty-four hours, 35 miles N. 5° E., the wind nearly calm. Its mean action in these eight days was 8.6 miles in twenty-four hours, to the E.S.E. We found it in the same manner, and a year later, in lat. 40° , during a strong S.E. wind, or S.E. current. It was not then so marked, but as far as lat. 31° its general direction was towards the N.E. quarter, and afterwards, in lat. $27\frac{1}{2}^{\circ}$, we again

found the S.E. current, two consecutive days, of 10 miles in twenty-four hours, with the weather nearly calm, or extremely light East winds.

Capt. Beechey found the same during three days in about lat. 35° N., lon. 166° E.; the currents then from 40 miles to the S.E. to 6 miles to the South, and 19 miles to S.E. by S.

These currents have a remarkable analogy with those which have been observed in the same latitude on the coast of Japan, when strong E. and N.E. currents predominate. In comparing these phenomena with each other, the conviction cannot be avoided that some connexion exists between them.

This is the only current in the northern part of the Pacific Ocean in which any sort of constancy has been observed independent of the prevalent winds; with the exception of this, we usually found that the currents followed the prevailing wind. To the North of this parallel of 42° , in the western part of the sea, we chanced to have the wind almost always from the East, and with it the currents to the West, which, during fresh breezes, were sometimes of 20 miles per day, and when it fell calm they ceased entirely. In some cases, on the contrary, when the winds passed to N.W., the current then turned to S.E.; the immediate influence of the wind was here evident. The same may be affirmed for the space comprised between the parallels of 30° and 32° and the limits of the N.E. trade-wind, although we have met with some exceptions. In our route from the Caroline Archipelago to the Bonin-sima Islands, we lost the trade-wind in lat. 22° , and thence to lat. 27° we had constantly currents to the North, which corresponded more with the direction of the wind than with its strength, they being sometimes very strong with very light airs. Their mean action in the interval of six days was 15.3 miles in twenty-four hours, to $N. 9^{\circ}$ E. To the North of the Bonin-sima Islands until we got into the N.E. current above described, we had westerly currents of the mean rate of 12 miles in twenty-four hours, with the winds fresh from East. Farther to the eastward, on the corresponding parallels, the currents were also to S.W., with easterly winds.

In the eastern part of the ocean, on our route to the N.W. part of America, the easterly winds accompanied us from lat. 30° to lat. 45° , with such constancy that we could not observe any change from the trade to the variable winds. Farther on, until we reached within sight of the land, the East winds still continued, but they were neither so fresh nor so steady as before. During the whole of this time the current was sometimes N.W., at others S.W., varying in strength from 5 to 15 miles, its mean velocity in the space of fifteen days being 8.6 miles per day to $S. 87^{\circ}$ W.

On leaving the N.W. coast of America we likewise experienced a S.W. current, but then it was more decided. In the first four days, up to lat. 54° , lon. 142° , it carried us to S.S.W. at the rate of 10 miles per day, even with winds from the West; it was only arrested once by a very strong wind from S.W. Farther on, on our route to Ounalashka, during which contrary winds obliged us to bear to the South, as far as lat. $48\frac{1}{2}^{\circ}$, we did not have, in the course of eleven days, up to lat. 52° , lon. 160° , any sort of current; thence to Ounalashka there was a weak current between N.W. and S.W. Its mean drift in twenty-four hours was, in four days, 6 miles to $S. 76^{\circ}$ W.

The currents experienced by us do not at all correspond with those observed by the Russian colonial marine, who found the motion of the water, driven by the almost continual West and S.W. winds, in general follows the direction of the coasts, in running to the North as far as Cook's Inlet, or Kenai's Bay, and from thence to the S.W. Between the N.W. coast of America and the meridian of Kodiak the latitude observed is always greater than that by the reckoning, and quite the contrary farther towards Ounalashka. Articles that have been dropped or been thrown overboard from vessels at 100 miles to the S.W. of Sitka have been found in Prince William's Sound, or Tchougatskoi Bay; this shows also that the currents run to the North or N.E., and from this arises the great quantity of debris, of every description, thrown on shore in the neighbourhood of this bay. The current to the S.W. and S.S.W. along the Strait of Chelekhoff and the South coast of Alaska, as well as to the South coast of Kodiak, is confirmed by the inhabitants of this latter island, who search for, and always find, the wounded whales that have been abandoned, in the direction of Oukamok Island, where they are carried by the drift of the current. The strength of the southerly current, at 150 miles to the South of Kodiak, has been sometimes found to be 60 miles in twenty-four hours. This southerly current is sometimes met with at 3° to the East of the meridian of Kodiak, and extends to the passages between the Aleutian Islands, in which there are also periodic currents to the North, stronger than the opposing currents to the South. It is remarked, in general, that in spring and autumn the current is more strong and constant than in the other seasons; this perhaps explains why we did not find them in the order described.—(*Voyage du Sémavine.*)

8. WEST COAST OF NORTH AMERICA.

It would appear that the drift of the surface waters near to the eastern coast of the North Pacific is entirely governed by the wind, and accordingly any notion that can be gathered of them is best done by considering the force and direction of the latter. Following the usual law, it seems generally to be the case that they run to the northward, sometimes with considerable velocity when near the land.

The central portion of the North Pacific, therefore, appears to be devoid of any currents dependent on any primary cause; and around this space the currents circulate in the order which has been described.

In the *Physikalischer Atlas*, by Professor Berghaus, a space in the eastern part of this area in the North Pacific is called *Fleurieu's Whirlpool*, as it is translated in the British edition of that work. This vortex is assumed from the reasoning by Fleurieu on the voyage of *La Solide* by Etienne Marchand. But independent of the not very satisfactory conclusions arrived at by the geographer, in the appendix to the second volume of that work, it may very fairly be questioned whether the reckoning of the vessel is entitled to such dependence as to found any characteristic of the currents as is attempted in the chart alluded to. It was stated in the outset that the estimation of currents was no easy problem, and that many causes concurred in the error of a ship's reckoning which have been unjustly attributed to the effects of currents. This argument will probably apply with some weight to the voyage in question.

Vancouver, whose careful navigation would certainly have detected any great difference in his dead reckoning, came southward from Monterey towards Cocos Island, December, 1794. In his passage, as far as the meridian of Acapulco, he did not find more than half a degree variation, the dead reckoning having been in general to the *eastward* of the truth. But on passing to the South and East of this, his course was materially affected by a current setting to the westward, which in four days had drifted him about 2° to the West of his longitude; the latitude being $9^{\circ} 27'$. Between this and Cocos Island the set was at first half a knot to southward; after which very strong rippings, with great agitation, as if running over an uneven bottom, but none could be reached at 170 fathoms, nor any evidence of current. This certainly showed a conflict of currents, as before alluded to, in the Bay of Panamá.* When Cocos Island was made there was a very strong current ($2\frac{1}{2}$ knots) setting to the eastward and N.E. Colnett found it as strong to the West.

On the coast between Monterey and the Columbia, from March to October, the prevalent wind is fresh from the N.W., blowing with almost the regularity of a trade-wind, and causing a current of about half a knot per hour along the coast, setting to the southward. But, in opposition to the rule as regards the winds, in June, 1850, the winds to the northward of San Francisco were light from southward and westward.

From October to March the wind is variable, both in strength and direction. The current sets generally to the northward, varying in velocity with the strength of the wind.†

Sir George Simpson states that he was drifted 40 miles North of his reckoning, in going from Monterey to Sta. Barbara, making, in fact, S. Luis Obispo, instead of Point Concepcion. Vancouver anchored at Destruction Island, April, 1792 (lat. $47^{\circ} 37'$), and found a constant current setting along the coast, without intermission, to the northward, at a uniform rate of near half a league an hour. This current was felt all the way from Cape Orford, and estimated at 10 or 12 miles per day.‡

Lieutenant Wood, of H.M.S. *Pandora*, on the contrary, says that the set is usually to the *South* along the coast, near the Strait of Juan de Fuca.§

It is evident that these partial drifts cannot have any great connexion with the general system of revolution.

SEA OF BEHRING.||

In this sea we had but very few currents independently of the action of the winds which prevailed at the time. The few exceptions to this order seemed to show that to the South of the parallel of 60° the current had a greater tendency to the West than to any other quarter; we remarked that, although easterly winds always brought westerly currents, the westerly winds did not always cause

* Vancouver, vol. III. pp. 357-8.

† Notices of the West Coast of the United States, by Lieutenants M'Arthur and Bartlett, U.S.N., 1850, pp. 7-9.

‡ Vancouver, vol. I. p. 213.

|| Remarks by Admiral Lütke.

§ Nautical Magazine, June, 1851, p. 318.

the opposite. On the Asiatic coast this direction was South and S.W., parallel with the direction of the coasts. But these exceptions, confirmed besides by the remarks of some of the sailors in the service of the Russian American Company, are too rare and too undecided to found any reasonable induction from them. In general the currents corresponded to the winds, both in direction and force. Off St. George's Island, on the contrary, it is remarked sometimes, that there is for several days a constant West current of one or two knots. In the Gulf of Anadyr we either found no current at all, or but a very feeble one, which, besides, followed no order. We experienced but on one single occasion the action of the northerly current, which some navigators have found in Behring's Strait, when in two days it carried us 22 miles to N. 26° E., against light winds from the N.E. quarter. We then found ourselves on the parallel of the mouth of the Bay of St. Lawrence, and nearly in the middle of the Strait; but during some of the preceding days we had in this same spot a weak current to the S.E. In coming from the S.E. to the Bay of St. Lawrence, we also met with an easterly current of 12 miles in twenty-four hours. This current might be attributed to the melting of the snows, which was then going on, on the high mountains with which this bay is surrounded, and from whence torrents precipitated themselves at each step.

SEA OF JAPAN.*

I have spoken of the winds which prevail in this sea; it only, therefore, remains to say a word concerning the currents. Excepting the *Nadijeda*, there have only been La Pérouse and Broughton who have navigated the Sea of Japan; neither one nor the other make mention of any prevailing current. It is true that Broughton did only sail along the Corean Peninsula and the coast of Tartary, and very near the land: once he mentioned a current which bore him towards the S.S.W., at the rate of a mile and more an hour, and the difference itself, which is sometimes found in the tables of the track between the reckoning and the observations, is never great. This is also the case in the tables of the tracks of the *Boussole* and the *Astrolabe*; there is little or no difference between the longitude by accounts and by observations; as for the latitude, that is only given according to the observations.

During the first days of our cruise in this sea we experienced very weak currents. In lat. 30°, lon. 134° E., we found a current running to S.E. a mile an hour; we were then 100 leagues from land, and the wind was light from N.E. During the three following days in which we made for the land, the observations showed a current of 20 miles a day, bearing towards the South and West; but the day we discovered the N.W. coast of Japan we found a current to N.W. 21 miles in twenty-four hours. Near the coast it was still stronger: one day it carried us 28 miles in twenty-four hours; the following, the day we passed the Strait of Sangar, it carried us East by North at the rate of 2½ miles an hour, and nearer the coast it could not be less than 4 miles an hour.

Capt. Broughton is the only European known who has passed this strait: he found a violent current in its centre; all the vessels which passed through with

* Remarks by Admiral Krusenstern.

him closed, on his example, the land as near as possible, to avoid the stream of the current.

During our track along the western coast of the Isle of Jesso, we daily found a great difference between the observations and the reckoning, and that in different directions; sometimes the current bore us to the N.E., at others to S.W., then again to N.W. and West. There were nevertheless several days on which we did not observe any current. In the Strait of La Pérouse there was a flow and reflow. La Pérouse having anchored near Cape Crillon, observed a strong current *from* the East; we, on the contrary, found it *to* the East.

I believe that it may be concluded from the voyages of La Pérouse, Broughton, and our own, that, excepting in the proximity of the coasts, the Sea of Japan is not subject to any predominant current.

SEA OF SAGHALIN.*

As the *Naditjeda* is but a single ship which has been along the eastern coast of the Saghalin Peninsula, we cannot give any other notions than those which were acquired during this cruise. In Patience Bay, where we remained twelve days, the currents were weak and inconstant. Near to the cape of the same name, and up to a degree to the North of it, it had for three days a North direction, with a rate of only 8 or 10 miles a day, even with a northerly wind. Then the current shifted, and took a South direction, which seemed to me here to be the prevalent direction during summer; we experienced it even with winds from South and East. The current ran S.E. by S. $\frac{1}{2}$ S., at the rate of 28 miles a day. It is true that after three days of cloudy weather, our observations showed a difference of 18 miles to N.E. $\frac{1}{4}$ E.; but then this deviation from the ordinary rule is trifling, and the winds always blew from S.W. The latter observation indicated to us constantly a current to the South and East, as far as the northern extremity of Saghalin, when it suddenly changed its direction towards the North, then N.E., and then N.W., but with a velocity which never exceeded 9 or 10 miles a day. After doubling this point, or Cape Elizabeth, we found a current to N.W., which is probably owing to the velocity of the waters of the River Amour.

* Remarks by Admiral Krusenstern.

CHAPTER XXXVIII.

TIDES, MAGNETISM, ICE.

I.—TIDES OF THE PACIFIC.

EXCEPT on the surrounding shores, where they exhibit similar phenomena and magnitude to other parts of the world, the tides of the Pacific are insignificant, and almost unnoticeable to the mariner. In the tables at the commencement of the first part of the present work, we have given the elements of the tides necessary to navigation; that is, the hour of high water, and the rise and fall of the tide, on the coasts of America, Asia, &c. But in the vast space between these two boundaries the tidal wave is scarcely appreciable, except by refined observation, and can form but a small portion of the actuating consideration in navigation.

Under these circumstances we deem it unnecessary to enter into the general laws of the tides as founded by the illustrious Newton, or the interesting features elicited by the discussion of the Rev. Professor Whewell and Sir John Lubbock. They can be referred to elsewhere, as in our *Atlantic Memoir*, 1845, p. 146, *et seq.* And for those details, as applied to special localities, the reader will find them in the tables referred to, or in the pages of the work to which they appertain. The present consideration, therefore, will be confined to the general view of the Pacific tides, as recently set forth by Dr. Whewell, to whom the main features of the tidal laws, as they are now known, is mainly owing.

THE REV. W. HEWELL ON THE TIDES OF THE PACIFIC.*

I shall not attempt to determine the general course of the tides in the Pacific, but will remark that the view now given of the distribution of the tides in an ocean explains several of the features of the Pacific tides, which were before very perplexing. If we suppose an ocean tide, from the borders of which proceed tides having their progress marked by cotidal lines, we can easily draw the lines so as to include the following facts and observations:—

1. The *easterly* motion of the tide wave around Cape Horn, which is established by Capt. King's observations, and which is difficult to reconcile with the supposition of a tide revolving from West to East round the South pole. This is explained by its being a tide proceeding from an oceanic tide.

2. The tide being at nearly the same hour along a large portion of the coast of South America, namely, from the Strait of Magalhaens for 20° or 30° northward. This shows that the cotidal line is nearly parallel with the shore.

3. The very small tides, or no tides, at the islands in the centre of the Pacific, Tahiti, and the Sandwich Islands. These belong to a central portion of the ocean, where the rise and fall of the surface nearly vanishes.

* Extracts from a paper in the *Philosophical Transactions*, 1848, pp. 1—28.

There are two sources of inaccuracy in tide observations, namely, the want of a clear understanding as to the thing to be observed, and the irregularity and complexity of the facts themselves. With regard to the former point, I hope that several misapprehensions, formerly prevalent among navigators, are now no longer common; such as confounding the time of high water with the time of the turn of the tide stream. But there is probably still some unnecessary difficulty produced by regarding, as a cardinal point in observation, the "establishment," as vulgarly understood, namely, the hour of high water *on the day of new or full moon*; for, in fact, the hour of high water on this day is of no more importance than the hour of high water on any other day, except in so far as it gives the means of knowing the hour on other days. And it does not afford the means of doing this any more than the hour of high water for any other given age of the moon does. For just as much inaccuracy as, from whatever cause, there is in deducing the time of high water at all ages of the moon from the time at a given age, just as much inaccuracy is there, from the same causes, in deducing the time of high water for all ages of the moon, from the time for full or new moon. And if the time at which the tide follows the moon on two or three successive occasions be greatly and irregularly different, the observations are equally of little value, whether any of the observed tides fall on the day of the new or full moon, or do not. If the tides are regular, and the observations good, the common "establishment" may be obtained from the observations of any one day; although, to give much value to this deduction, the tides should be observed for a fortnight. And if such observations be made for a number of very distant places, the common "establishment" does not represent a corresponding fact at different places. In some places it means the time of high water one day after the highest tide; in some, the tide two days after the highest tide; in some three days; for the "age of the tide" is different at different places, and the tide which corresponds to the new or full moon comes after the new or full moon by one, two, or three days. Hence, in order that we might compare the tides of distant places by means of a fact which had the same meaning in all of them, I proposed, in a former essay, instead of taking this common establishment, to take what I then called the *corrected establishment*, namely, the *mean* of all the lunitidal intervals, that is, of the intervals by which the tide follows the moon's transit. In general the corrected establishment is about thirty minutes less than the common establishment. It has been used by Admiral Lütke, in his discussion of the tides of the Pacific. As the common establishment is still the one familiar to navigators, and as no material error will result from the use of it, I shall make it the basis of my remarks on the tides of the Pacific. It may be useful to bear in mind what I have said, that this establishment may be deduced from observations not made at the new or full moon.*

I shall now proceed to give the tide hours for the coasts of the Pacific, according to the best accounts which I find, judging them in the manner I have described. After noticing the course of the tide near Cape Horn, I shall follow it along the whole western coast of America, till, in the North, we

* I have here said that in cases where the tides follow the common laws we may deduce the time of high water on one day from the time on another: I might have said the same thing of the heights.

reach the Aleutian Isles; and then, following this chain of islands, to the shores of Kamtschatka. I shall then consider the islands in the central parts of the Pacific, and proceed from them westward, according to my materials.

I have, in my first essay, shown that round Cape Horn the tide wave has an *easterly* motion. Thus, as I have there said, according to Capt. King,* at Cape Pillar it is high water on the day of full and change; at York Minster, 5° lon. to the East, it is at 3^h; at Cape Horn, 3° farther East, it is at 3½^h; in Good Success Bay, in Strait Le Maire, the hour is 4; on the East side of Strait Le Maire it is 5^h. It appears also from Capt. King's observations (p. 17), that the tide travels in the same direction along the coast, that is, to the northward, on the eastern shore of Patagonia. This direction appears, by Capt. FitzRoy's Tables,† to continue as far northward as lat. 40°, the wave employing about twelve hours in travelling from lat. 50° to 40° S. Along this coast the tides are very large; at Gallegos River, in lat. 52°, they rise 46 feet. This circumstance might lead us to imagine that they are the result of accumulated waves converging from the North as well as the South; and this is probably the case. Yet it is remarkable, especially when considered in connexion with this view, that in the great estuary of the Plata there is no perceptible tide.‡

I shall not, however, dwell at present upon the tides of the Atlantic, and shall proceed to those of the western coast of America.

WEST COAST OF AMERICA (SOUTH).

	Lat. South.	Lon. West.	Tide Hour.		Greenw. Time.		Rise.	Authority.
	°	H. M.	H. M.	H. M.	H. M.	FT.		
Cape Pillar.....	52 46	5 0	1 0	6 0	...	...		King's Tables, p. 15.
Chiloe.....	41 52	4 57	11 30	5 0	6	12		Heron, R. B.
".....			12 30	.....	...	...		Norie, Purdy.
Valdivia.....	39 50	4 56	11 30	3 26	...	...		FitzRoy, p. 284.
".....			.....	3 30	...	...		Malaspina.
Concepcion.....	36 49	4 53	10 0	2 53	...	...		Malaspina.
Valparaiso.....	33 2	4 45	9 25	2 10	...	...		Malaspina.
".....			9 40	.....	4	...		Du Petit Thouars.
Coquimbo.....	29 54	4 45	9 20	2 5	...	...		Remark Books.
".....			.....	2 0	...	...		FitzRoy, p. 285.
Iquique.....	20 0	.....	.....	1 30	...	...		FitzRoy, p. 285.
Arica.....	18 28	4 40	.....	.....	...	...		FitzRoy, p. 285.
Callao.....	12 4	5 7	6 15	.....	...	...		Malaspina.
".....			6 0	11 7	2½	...		Du Petit Thouars.
Payta.....	5 3	5 24	3 18	.....	6	...		Du Petit Thouars.
<i>Guayaquil.</i>								
Puna Island.....	3 27	5 19	5 0	.....	12	...		Sir Edward Belcher.
Punta Piedra.....	3 30	5 19	6 10	.....	10	...		Kellett.
<i>Galapagos.</i>								
Charles Island.....	1 15	6 2	2 10	8 12	...	...		FitzRoy, p. 84.
Chatham Island.....	1 0	5 54	3 30	.....	...	...		Purdy, Eth. Mem.
Isla Charles.....	.....	.....	3 19	.....	6	...		Du Petit Thouars.
<i>North.</i>								
Cocos.....	5 34	5 15	2 10	7 35	...	...		Purdy, E. M., p. 50; Vancouver.
".....	.....	.....	4 0	.....	...	...		Purdy, E. M., p. 47; Colnett.
".....	.....	.....	.....	8 0	...	...		FitzRoy, p. 285.
Panamá.....	8 57	.....	3 20	.....	...	...		Lloyd, Phil. Trans. 1830.
Panamá Bay.....	.....	5 18	4 0	.....	13	...		Kellett.
" ".....	.....	.....	3 36	8 54	15	...		Sir Edward Belcher.

* Sailing Directions, p. 96.

† Appendix, p. 66.

‡ FitzRoy, Appendix, p. 280.

WEST COAST OF AMERICA (NORTH).

	Lat. North.	Lon. West.	Time H. W.	Greenw. Time.	Rise.	Authority.
<i>Nicoya</i>	0 /	H. M.	H. M.	H. M.	FT.	FitzRoy.
<i>Inland S. Lucas</i>	9 56	5 42	3 0	8 42	6	Sir E. Belcher.
<i>Realejo</i>	12 28	5 48	3 0	8 48	6	Sir E. Belcher. Great irregula-
<i>Acapulco</i>	16 50	6 39	2 41	9 20	1	Sir E. Belcher. [rities.
"			3 5	9 44	2	Du Petit Thouars.
<i>Magdalena Bay</i>	24 38	7 28	8 30	.....	6	Sir E. Belcher. Very anomalous.
"			7 37	3 5	6	Du Petit Thouars.
<i>San Blas</i>	21 32	7 1	8 5	3 6	...	Mem. on S. America.
" .....			.....	3 0	...	FitzRoy.
"			9 41	4 42	...	Beechey.
<i>Mazatlan</i>	23 0	7 10	9 50	5 0	...	Beechey.
<i>Monterey</i>	36 36	8 6	9 42	5 48	...	Beechey.
"			9 52	.....	7	Du Petit Thouars. [ious.
<i>San Francisco</i>	37 48	8 9	12 30	.....	6	{ Sir E. Belcher. Very anoma- Diurnal inequality, H.W. and L.W., large in ht. & times.
"			10 52	.....	...	Beechey and Malaspina.
"			10 33	6 42	6	Russian nav. (Lütke's notice.)
<i>Port Bodega</i>	38 19	8 11	11 41	7 52	...	Russian navigators.
<i>Columbia River</i>	46 16	8 16	1 0	9 16	8	Sir E. Belcher.
"			1 30	.....	...	Vancouver.
<i>Straits of Juan de Fuca</i> ...	48 0	.....	12 30	.....	8	Kellett.
<i>Nootka Sound</i>	49 36	9 2	10 40	.....	12	Sir E. Belcher. Great diurnal
"			12 33	9 35	12	Lütke. [inequalities.
<i>F. Nicolaëfsky (Cook's Inlet)</i>	60 15	10 6	3 49	1 55	28	Wrangell.

From this point the coast turns westward, and the stations are arranged according to longitude, without regard to their latitude.

	Lat. North.	Lon. West.	Time H. W.	Greenw. Time.	Rise.	Authority.
<i>American Coast.</i>	0	H. M.	H. M.	H. M.	FT.	
<i>F. Nicolaëfsky (Cook's Inlet)</i>	60 15	10 6	3 49	1 55	28	Wrangell.
<i>Harb. of St. Paul (Kadiack Island)</i>	57 46	10 8	0 30	10 38	10	Russian navigators.
<i>Harbour 3 Hierarq.</i>	57 8	10 12	0 19	10 31	10	Russian navigators.
<i>Nouchagak Bay</i>	58 31	10 34	2 14	0 48	12	Wrangell.
<i>Alaskan Isles.</i>						
<i>St. Paul Island</i>	57 10	11 20	3 47	3 7	4	Russian navigators.
<i>Atka Island</i>	52 25	11 36	0 20	11 56	5	} Russian navigators, doubtful.
<i>Attou Island</i>	52 57	12 28	0 48	1 16	22	
<i>Kamtschatka.</i>						
<i>Petropanulovski</i>	53 1	13 26	3 38	5 4	4	Lütke, in 1827. [qualities.
"			3 43	5 9	...	Lütke, in 1828. Diurnal ine-
"			3 54	.....	3	Du Petit Thouars.

Looking at the general assemblage of the numbers which occur in the column marked "Greenwich time," it is evident that the tide wave of the hour 8, which is at Cocos Island and the Galapagos about eight o'clock, comes to the continent at Nicoya and Realejo, about 10° and 12° N. lat., at about three-quarters of an

hour later; while the tide is at hours later than this, both to the northward and the southward. Proceeding first southward, we find the line of XI. not far from Callao, that of II. near Coquimbo or Valparaiso; and that of III $\frac{1}{2}$ near Valdivia; and farther South we have the line of V. at Chiloe, and of VI. at Cape Pillar; whence the wave moves to the eastward, round Cape Horn, as already stated. Considering these points as fixed, it is easy to interpolate the other cotidal lines along this coast. The observed hour at Guayaquil is later than its position would give, a result which we should expect, since the tide will occupy some time in travelling up the gulf in which Guayaquil is situated.

Again, proceeding from Nicoya and Realejo, to the northward, we find a like progression of tide hours. The line X. is not far from Acapulco, according to the data here collected. But the tide at Acapulco is small, and hence the accuracy of the result is doubtful. Perhaps the smallness of the tide is an indication that the point of divergence of the tide wave, which occurs on this part of the American coast, is not far from Acapulco. It appears that the line of III. passes near San Blas, and also near the Bay of S. Magdalena, on the coast of California. At Mazatlan, somewhat within the Gulf of California, the time is an hour or two later, as we should expect. When we reach Monterey and San Francisco, the hour is about 6, according to Capt. Beechey's observations. The more recent ones are too anomalous to proceed upon. At Port Bodega, in lat. 38°, we have the VIII. tide line; and at Nootka Sound, Cook's observatory, which give 12^h 30' (whence Greenwich IX. nearly), are confirmed by Capt. Kellett's observations in the Straits of De Fuca, South of Vancouver's Island. The next point is the Russian settlement, New Archangel, in the Island of Sitka, where the tides exhibit very curious features, as I have already stated from the observations of Admiral Lütke,* and, as I find, further confirmed by the observations of Sir Edward Belcher. The line belonging to Sitka appears to be IX $\frac{1}{2}$.

From this point we depend upon Russian observations, which are given by Admiral Lütke in his "Notice." These enable us to see that the cotidal lines bend, as usual, deep into the head of the bay in which is Cook's River (Inlet), in lat. 60°. The coast here trends to the West, and the wave follows it, and pursues its course along the chain of the Aleutian Islands, where it is traced by Admiral Lütke and the navigators of the Russo-American Company. It appears that the lines of XI., XII., I., II., fall near this chain, and that the line of V. is near the coast of Kamtschatka. It is not difficult to arrange the cotidal lines so as to conform to these data.

Admiral Lütke has observed the tides at other places on the Asiatic coast, as far North as 65°, but I shall not attempt to arrange them.

Our next attempt must be to arrange the tides of the oceanic isles of the Pacific, taking, in the first place, those South of the Equator.

* See Philosophical Transactions, 1840, part i. p. 107.

ISLES OF THE PACIFIC (SOUTH).

	Lat. South.	Lon. West.	Time H. W.	Greenw. Time.	Rise.	Authority.
	^o /	H. M.	H. M.	H. M.	FT.	
Easter Island	27 9	7 20	2 0	9 20	...	Norie.
Gambier group	23 0	9 0	1 50	10 50	...	Beechey.
Lagoon Island	18 0	9 18	12 30	9 48	...	Cook, Phil. Trans., 1772.
" " <i>Marquesas.</i> .....	.....	.....	11 15	.....	...	Lalande.
Resolution Bay	9 53	9 20	5 7	2 27	6	Du Petit Thouars.
Low Archipelago.						
Bow Island	18 6	9 23	6 30	3 53	1	Belcher.
Tahiti .....	.....	.....	Anoma	lous.	...	Belcher.
<i>Tonga Isles.</i>						
Annamooka	20 15	11 40	6 0	6 20	...	
Eoa .....	.....	11 40	7 0	7 20	...	
Tonga-tabu	21 8	11 41	6 50	7 19	...	
Wallis Island	13 26	11 44	5 0	4 44	...	Zebra, R. B.
<i>Fæje Islands.</i>						
Nakulan	18 9	12 6	8 30	8 36	5	Belcher, Diurn. inequalities.
Muthusta .....	.....	.....	5 30	.....	6	Wilkes, U.S. Ex., v. iii. p. 322.
Ovotau .....	.....	.....	6 10	.....	...
<i>New Hebrides.</i>						
Tanna, Port Resolution	19 32	12 41	5 45	6 26	...	Lalande.
New Caledonia	20 17	13 2	6 30	7 2	...	Norie.
Norfolk Island	29 0	12 48	7 45	8 33	...	Norie.
New Zealand, Tolaga Bay ...	38 22	12 57	6 0	6 7	...	Cook.
<i>New Ireland.</i>						
Carteret's Harbour	4 39	13 50	Anoma	lous.	...	Belcher.

We have also the following observations, given North of the Equator :—

ISLES OF THE PACIFIC (NORTH).

	Lat. North.	Lon. West.	Time H. W.	Greenw. Time.	Rise.	Authority.
	^o /	H. M.	H. M.	H. M.	FT.	
<i>Sandwich Isles.</i>						
Honolulu	21 18	10 32	3 35	2 7	2	Du Petit Thouars.
" .....	.....	.....	2 55	.....	...	Kotzebue.
<i>Caroline Isles.</i>						
Ualan	5 15	13 7	3 35	4 42	5	Lütke.
<i>Ladron Islands.</i>						
Guahan	13 32	14 20	8 23	10 43	...	Freycinet.
Bonin Isles	26 52	14 29	6 43	9 12	3	Lütke.
" " .....	.....	.....	6 3	.....	...	Beechey.
Loo-Choo Isles	26 30	15 28	6 28	9 56	6	Beechey.
Sand Isle, Samboanga	6 55	15 52	7 36	11 28	4	Belcher.
<i>Bashee Group.</i>						
Baton Island	22 0	15 50	.....	.....	...	Belcher.
Corean Archipelago	34 17	15 51	4 49	8 40	12	Belcher. Anomalous.
Patchusan	26 20	15 41	6 36	10 17	5	Belcher. Diurn. inequalities.
Hong Kong	22 12	16 23	9 37	2 0	6	Belcher. Diurn. inequalities.
Amoy Harbour	24 16	16 8	12 52	5 0	18	Capt. H. Smith.
Santubon	1 48	16 39	4 21	9 0	12	Belcher.

These observations, especially those South of the Equator, appear to imply a general motion westward of the tide wave; but I conceive that they are much too far and too unconnected to justify me in drawing cotidal lines; besides which, the smallness of the tides in the central parts of the ocean makes the observations more than usually doubtful, and is accompanied by some circumstances incon-

sistent with the notion of a simple progressive wave as the representation of the tidal phenomena of those seas. I will consider those circumstances for a moment.

Tides of the Central Pacific.

The tides over a great portion of the central part of the Pacific are so small, that we may consider the lunar tide as almost vanishing. Thus, at Bow Island, it is stated as only 1 foot; at Tahiti it is hardly more; at the Sandwich Islands it is 2 feet; and even at New Ireland, where we are no longer in the central space, but among the larger islands to the West of it, the tide is only about 2 feet. But moreover, at some, at least, of these places, the tide, small as it is, is not the *lunar* tide following the usual laws. At Tahiti, for instance, the time of high water appears never to deviate from noon by more than a certain difference, although Sir E. Belcher has shown that it varies from about 9^h A.M. to 3^h P.M.* At Bow Island there appears reason to believe that the limits are much the same; and perhaps at Carteret's Harbour, in New Ireland. Now it will be easily seen that such a result as this would follow if we were to suppose the tidal influence of the sun and of the moon to be equal. On this supposition it is plain that the high water would always occur halfway between the sun's transit and the moon's transit. Hence at new moon the high water would be at noon; as the moon went away to the eastward of the sun, the tide would be later and smaller; till, when the moon was six hours' distance from the sun, the tide would be at 3^h; but would in fact vanish. After this point the tide would reappear at 9^h A.M., or a little later, the inferior transit of the moon now taking the place of the superior one, in determining the tide; and from this time the tide would be gradually later and larger, till, at full moon, it would be again at noon: and so on. This appears to agree pretty well with the phenomena of the tides at Tahiti, as determined by Sir E. Belcher.

A more minute examination of the tides in these regions will enable us to pronounce more decidedly whether the law of the phenomena is that which has been just stated. And if it appears that the phenomena do follow this law, we shall have further to consider how such a motion of the sea in those parts is to be combined with the very different movements which occur in other places, and what is the general movement of the ocean which they indicate; whether, for instance, they are best explained by looking upon the lunar and solar parts of the tide, as produced by two separate waves, which may increase and diminish separately, and may start from different epochs in their motions. I shall not now pursue this point further; nor shall I further examine how far the phenomena approach to the cases of fluid motion already described, in which there is a marked wave at the outskirts of the mass, and an approximate quiescence of the surface in the central parts; namely, the case of a stationary undulation, and of a revolving undulation, or rather a revolving cotidal line: I may remark, however, that the latter supposition, that of a revolving undulation, by which the tide is carried from California northwards along the American shore, and to the coast of Kamtschatka, while the cotidal lines converge to some central point in

* Philosophical Transactions, 1843, part i.

the North Pacific, would explain the smallness of the tides at the Sandwich Islands. When we proceed westward from the central parts of the South Pacific to New Zealand and Australia, we again find the feature which we have already noticed in the tides, namely, that the cotidal lines run nearly parallel with the shore in its neighbourhood, but that we cannot easily infer the oceanic from the littoral tides; for the tide lines of VI., VII., VIII., IX., X., XI., succeed each other along the coast of New Zealand, and apparently double round its northern and southern extremities, as we should expect from the laws of fluids. But yet the line of X. recurs again on the coast of Australia, and is succeeded by later hours as we proceed northward and southward from about lat. 30° S. Cotidal lines may be drawn to accommodate themselves to these data; but of these lines the parts which occupy the ocean between New Zealand and Australia must be very doubtful.

I have been favoured by Sir James Ross with about a month's observations of the tides in the Bay of Islands in New Zealand; but my means of tracing the progress of the tides along the coast of New Zealand still depend on Capt. Cook's statements.* The longitude of New Zealand is so nearly 12^{h} , that the local tide hour may be considered as coincident with the Greenwich hour. At Tolaga Bay, near the most easterly point of these islands, the time is 6^{h} . In proceeding to Mercury Bay and the Bay of Islands, on the N.E. coast, it becomes $7^{\text{h}} 30'$ and 8^{h} respectively. And in proceeding southward from Tolaga Bay we have also a retardation. At Queen Charlotte Sound, and Admiralty Sound in Cook Strait, which separates the two islands, it is $9^{\text{h}} 30'$ and 10^{h} , the strait producing a considerable retardation. At Dusky Bay, the southern point of the island, the time is $10^{\text{h}} 57'$.

(We omit here the remarks on the Australian tides.)

I have now put together all the principal materials which I have procured for determining the course of the tides in the Pacific. But it is apparent, from what has been said, that the materials are insufficient to give us any complete or consistent view of the tidal movements of the waters of the ocean and the neighbouring seas.

I may observe, moreover, that there appears to be little chance that our knowledge of these tides will be much increased by observations made in voyages principally directed to other objects. Although, in the surveying and exploring voyages since Capt. King's, many tide observations on the coasts, and at the islands of the Pacific, have been made, and many of them with care and skill, we have scarcely any material facts added to our knowledge; and the cotidal lines for the shores of America, New Zealand, and Australia, as I drew them in 1833, remain with scarcely any alteration. Cook's observations at New Zealand, for instance, are for this purpose better than any since made, because they are connected (being made by the same navigator, and in close succession), and extend along a continuous shore. It is only by observations thus connected, and having some degree of geographical continuity, that we can hope to trace the course of the tides.

* Philosophical Transactions, 1772.

2.—MAGNETISM.

There is in either hemisphere a magnetic pole. In the northern, the dipping needle, or a magnetic needle suspended freely so as to move only in a vertical direction, will remain quite perpendicular. In the southern hemisphere there is exactly an analogous point, when the dipping needle also stands perpendicular, but with this difference, that here the North end of the needle is downwards; in the North hemisphere it is the South end. Between these two poles a line may be traced on the earth's surface, in every point of which the magnetic needle will stand perfectly horizontal. This curve is not circular; but, for a considerable portion of its circuit, it does not vary much from a great circle, the plane of which is inclined 12° to that of the terrestrial equator. By analogy this circle is called the magnetic equator.

Besides this, when the magnetic needle is balanced in an horizontal plane, and can move freely on its centre, it is well known that in any place it assumes a particular direction, which is sometimes more or less oblique to the geographic meridian. The vertical plane, therefore, of the magnetic needle, is called the magnetic meridian, and the angle which it forms at each point of the globe with the terrestrial meridian is called the magnetic declination or variation. Its magnitude is not constant at all times; for the same place, and in the course of a single day, small periodic variations are observed, connected, as has been recently demonstrated by Professor Faraday, with the action of the sun on the oxygen of the atmosphere, now demonstrated to have magnetic properties. There are also small changes due to the seasons, also arising from the same cause. But the absolute variations are so slow, that in reality they only become manifest after a series of years. For this reason, during a single voyage, or even during several voyages, it is not necessary to take any account of the change in variation, but to regard it as absolutely fixed, having the prudence, however, of measuring the amplitude frequently, so as not to place too much confidence in any determination.

If these magnetic meridians be drawn on a map, it will be seen that near the magnetic equator they are nearly perpendicular to it: and according as the poles are approached, they curve towards the points where the dipping needle becomes perpendicular.

The last element of the magnetic forces is the law of the variation of its intensity in various parts of the globe. It is estimated by the rate of the oscillations of the *same needle* tried in different places, in the same way that the variations of the force of gravitation are assumed from the vibrations of the same pendulum swung in different places. This third species of experiment demonstrates generally that the intensity increases from the magnetic equator to the two polar points, to where the magnetic meridians, defined previously, converge. But the rate of this increase, as well as of that of the inclination (or dip), present some very evident inequalities of detail. Besides, in using the compass, the amplitude of the inclination is found to undergo changes which are not simultaneous, or have the same extent, with the changes in other parts.

From all this the existence of a principal magnetic force may be concluded, arising as a result from the entire mass of the earth, and the general effects of

which are locally modified by secondary magnetic forces, having their centre of action at a small distance below the surface of the earth, in the portions of the mass which induce, or are induced by, the perturbations of the internal equilibrium.

This abstract of the magnetic theory first appeared in 1804 by MM. de Humboldt and Biot. But the magnetic meridians were first traced by Capt. Duperrey, with immense labour. There have been many competitors in the same field in later days, and it has been one of the principal objects of recent voyagers. D'Urville, Sir James Ross, and Wilkes, all coasted the antarctic lands in attempting to reach the southern magnetic pole, as has been alluded to on page 672.

We cannot enter here into the details of the magnetic effects as they exist in the Pacific, more especially as, in the present state of the science, our knowledge, as far as has been hitherto published, is not so complete or accurate as in the other portions of the globe, and much of the remarks must apply to features of the science which do not interest the navigator in shaping his course or ascertaining his position. The practical portion of nautical magnetism will, therefore, limit our observations, and on this we will be the more diffuse, as this work may reach those parts where other books, more especially devoted to this end, may be unattainable.

There is one branch of magnetism, connected with the navigation of a vessel, which is but little understood generally, and, therefore, almost entirely neglected; yet is of very great importance to general safety. This is the *local deviation* of a vessel, or the influence the ship herself has upon the direction of the compass needle. It has received more attention of late years, and every ship in the navy, prior to her setting out on a voyage, is examined, so as to ascertain the amount of this variation from the correct direction of her compasses. It were much to be wished that such a system prevailed among the mercantile marine. Capt. Edw. J. Johnson, R.N., the superintendent of the naval compass department, thus writes:—

“While the tides and currents of the ocean—imperfect logs—inaccurate charts—unsteady steerage—inattention to the lead—stress of weather—defective ships—defective equipment or defective management, may be the cause of loss, it would be fallacious to assume that the greater number of wrecks are caused by errors of the compass; but that many have occurred in consequence of these there can be no doubt whatever, as will be shown, and without undervaluing that old and sensible motto, ‘Lead, log, and look-out!’ which, under all circumstances, should be preserved and acted upon; yet every rational seaman will admit that, wherever a *cause* of error is proved to exist, the amount of such error should be ascertained, and due allowance be made for the same in navigating his ship.

“The statement, that ships have been and are still navigated across the seas by persons who have no knowledge of the ‘*deviation* of the compass,’ is certainly not an argument against the correction of proved errors; and although prejudice or inattention may frequently prevent their detection, yet the evidence hereafter adduced will clearly show that such errors have not only placed ships in danger, but have actually, on many occasions, caused their total wreck.”*

Now, without unduly elevating the importance of this subject, it must be

* “Practical Illustrations of the Necessity for ascertaining the Deviations of the Compass.” London, 1847.

insisted on that great additional security will be given to a ship, especially during hazy weather, if this, her local deviation, is taken into the account. Although it is beyond our present scope to enter fully into details, we will here lay before the reader a general outline, in order that he may form an opinion upon its importance.

In our Atlantic Memoir,* pp. 490—500, there is a description of the general magnetic phenomena as connected with the compass. From that we extract the following :—

Magnetism is a principle which is evidently a modification of, if it is not identical with, electricity and galvanism. For in the causing any or either of these principles to become evident to our senses, we produce, at the same time, the others ; and it may be here stated, that five apparently dissimilar effects are inevitably caused in the production of either : these are—light, heat, chemical action, electricity, and magnetism. By the production of *light*, we cause heat and chemical affinity, and these will also produce *electricity*, and will cause the magnetic needle to swerve from the meridian. By the electric fluid we produce *light*, *heat*, and the other phenomena ; and the magnetic needle is a measurer, by its deflections, of the most minute portions of galvanism. From the *magnet* a spark can be produced, absolutely similar, in appearance and effect, to that of electricity and galvanism. There is a positive and negative state of electricity and galvanism ; and there is a positive and negative, or North and South, pole to the magnet, and these attract or repel each other.

There is one phenomenon, connected with these sciences, of very great importance in practice, and that is, that of *induction* ; a substance electrified *positively* will induce a state of *negative* electricity, or will cause a body to be negatively electrified, that is within its influence ; the North pole of a magnet will induce an opposite pole in that of another piece of iron, in certain positions with respect to the magnetic meridian and itself. Thus, the iron employed in the construction of a ship, or contained in its cargo, may all become, by *induction*, temporary magnets, and have a most marked and important effect upon the compass, by which it is steered ; and it is this cause, which is too frequently overlooked—that of the *local deviation*—which has caused enormous errors in reckoning, and consequently the loss of many vessels.

Among the other causes of disturbance to the compass, the Auroreæ Borealis and Australis appear to have the greatest effect of all natural phenomena ; and it has been inferred from this, that they are magnetic effects in themselves ; but the amount of aberration they occasion is comparatively minute, and in ordinary circumstances would not be noticed. Electricity (as lightning) has also a marked effect on the needle.

Iron is not the only substance which can be rendered magnetic, but almost *every substance* acquires some portion of the influence which is capable of acting on others. So that the whole fabric of a ship, in addition to the iron used in its construction and fittings, must exert a magnetic influence on the compass. It is probable that, in all sailing vessels, there is little or no appreciable amount of *permanent* magnetic polarity (though in steamers, or iron ships, the case may be otherwise), but that the whole of the *transient* polarity induced in the iron by the

* Memoir, Descriptive and Explanatory, of the Northern Atlantic Ocean, by John Purdy. Ninth edition, by Alex. G. Findlay. 1845.

earth's action, at any given moment and locality, is not *instantaneously* destroyed and exchanged for a new magnetic state, on a change of geographical place or angular position, though the greater part of it is so. A residual polarity lingers, as it were, in the iron of the ship, and fades out more slowly, so that the vessel carries with it, into every new point of its course, some trace and impress of the terrestrial magnetism of those which it has just left.

We have said before that not only iron, but that every substance, is capable of receiving some portion of the magnetic power, and, consequently, of acting upon other substances. Now it is found that the intensity of the magnetic force is greatest at the opposite extremities or poles of a magnetised body; that is, that the opposite kinds of magnetism, North and South polarity, repel each other to the greatest possible distance. As the ship herself is, therefore, a magnet in degree, we naturally look for the greatest effects of that magnetic power in the direction of her *length*, and although this is not always strictly true, yet in the majority of sailing vessels it is so. Thus, of course, the magnetic influence of the ends of the vessel upon the poles of the needle is at the *maximum* when their direction is at the greatest variance from those poles; and at the *minimum* when these directions exactly coincide. Therefore, when a vessel is sailing *East* or *West*, the effects of her own magnetism upon the compass is at a *maximum*; and when the needles coincide with the direction of her length, it is then at a *minimum*. It is this which is called the *local deviation* of a vessel, and will in some vessels amount to half, or one and even *two points* from the correct bearings.

It must not be supposed that the amount of local attraction is the same in all sailing vessels; it varies very considerably, not only in different parts of the world, but also in different parts of the same ship, and according to the trim of the vessel; when she is heeled over, it varies frequently much from what it would be on the opposite side. It can only be ascertained by direct experiment. The following table (copied from Capt. Johnson's work) will show the amount of ascertained deviations on board some of H.M.'s ships:—

Direction of the ship's head.	<i>Trafalgar</i> , 120 guns.	<i>Collingwood</i> , 80 guns.	<i>Vernon</i> , 50 guns.	<i>Fantome</i> , 20 guns.	<i>Brebus</i> .	<i>Terror</i> .
N.	0 5 E.	0 10 W.	0 52 W.	0 15 W.	0 25 E.	0 42 E.
N.N.E.	1 40	0 50 E.	0 48 E.	1 20 E.	2 35	3 10
N.E.	3 10	2 0	2 0	3 5	4 15	4 50
E.N.E.	4 10	3 45	2 41	3 31	5 15	5 5
E.	4 20	3 50	4 32	4 0	4 55	4 57
E.S.E.	4 25	3 30	4 0	3 54	3 20	3 25
S.E.	3 10	2 40	2 30	1 48	1 45 E.	2 2
S.S.E.	0 40 E.	2 0	0 55 E.	0 42 E.	0 15 W.	0 40 E.
S.	0 0	0 15 E.	0 54 W.	0 30 W.	1 0	0 50 W.
S.S.W.	1 25 W.	1 30 W.	2 32	1 48	2 5	1 55
S.W.	3 10	2 2	4 25	3 8	3 5	3 15
W.S.W.	4 35	3 30	5 10	3 38	3 35	4 20
W.	4 30	4 10	4 57	4 10	4 0	4 20
W.N.W.	3 35	3 50	4 56	3 58	3 50	4 20
N.W.	1 55	2 40	3 34	3 45	3 0	3 5
W.N.W.	1 15	1 20	2 5	1 45	0 40	0 58

The preceding table will amply explain the foregoing remarks ; but there are many other points to which attention ought to be drawn in the due consideration of the subject. Iron, of all substances, exerts the most powerful influence on the magnetic needle. And the ratio of this influence is at its *surface*, and the distance it is off the compass. In the *Garryowen*, iron steam vessel, it was found that there was a difference of $5^{\circ} 20'$ in the deviation by the mere circumstance of swinging the quarterboat's iron davits inboard. Iron, even in very small quantities, if near the binnacle, powerfully attracts the compass ; and any iron tillers, or other bars, ought to be specially guarded against, whether beneath the decks, or on them ; for there is no substance yet discovered which has the property of impeding the passage of the magnetic fluid.

Another source of deviation is the mutual influence which magnetic needles exert on one another, if they are near each other ; as is generally the case with the binnacles being too close together. In some experiments conducted by Capt. Johnson, R.N., in the reciprocal action of two compasses, 2 feet apart, the error in both of them amounted frequently to 7° , 8° , and 9° , from this cause alone. It has been ordered that no vessel in the navy shall have her compasses nearer than within the distance of $4\frac{1}{2}$ feet of each other. In ships where the diameter of the wheel is small, it is much best to have but *one* binnacle on the centre line of the ship.

Another cause of error may be in the imperfection of the instrument itself, or from its being improperly used ; but we have not space here to dilate on this. Hitherto our remarks have only been applied to sailing vessels, but the accurate performance of the compass is more important in steam vessels, inasmuch as from the nature of their navigation correct bearings are indispensable. It is found, however, that the local deviation in such a vessel is very much greater than in a sailing vessel. This is owing to the amount of iron employed in her machinery, boilers, and fittings, which, as we have before mentioned, exert an influence as powerful as if they were solid masses of iron. In them, therefore, the deviations will be found to vary 30° and 50° from the truth, and nothing but direct and careful experiment can be depended on for estimating these changes. In iron vessels, the action of the compass is frequently so capricious and anomalous, that it requires the utmost skill and judgment in applying those means which are available to overcome, or rather neutralize, the action of the vessel upon them. There are means of regulating the direction of the compass in every vessel, such as those proposed by Professor Airy or Professor Barlow ; but it sometimes happens that these perform their office imperfectly, and it is, therefore, in every way advisable for the commander of a vessel to ascertain, by swinging his ship, the real amount of action that the ship has on the compass.

It will appear evident, from what has been said, that this *local attraction* of a vessel will tend to draw the North end of the needle to the East, when the vessel's head is to the East, and consequently that her real course will be as much to the *South* of the apparent compass course as the amount of this local deviation.

There is no doubt that many of the very great discrepancies, which are found between the dead reckoning and the true course, will be owing to this ; as well as the effect of imaginary currents, to which such errors are frequently attributed.

A combination of these circumstances, all directed in one way, will account for many of those enormous differences which perplex the mariner accounting for his errors of dead reckoning.

3.—ICE.

In the first part of this work (pages 553—560) we have given a description of the polar ices as they have been found surrounding the arctic regions. As these ices do not, so to speak, properly belong to the Pacific Ocean, those of the South Pole will be more particularly considered here.

The ensuing remarks on the antarctic ices are chiefly derived from Capt. Wilkes, as detailed in the second volume of his narrative.

The observations of the U.S. squadron, in 1839 and 1840, would seem to confirm the opinion that very little change takes place in the line of ice. It may be inferred that the line of perpetual congelation exists in a lower latitude in some parts of the southern hemisphere than in others. The icy barrier retreats several degrees to the South of the antarctic circle, to the West of Cape Horn, while to the eastward it advances to the northward of that line, which is no doubt owing to the situation of the land. From the great quantities of ice drifting in all parts of the ocean, in high southern latitudes, it is probable that the formation of ice islands is much more rapid than is generally supposed.

The manner of their formation is thought by Capt. Wilkes to be easily explained. In the first place the ice seems to require a nucleus, whereon the fogs, snow, and rain, may congeal and accumulate; this the land affords. Accident then separates part of this mass from the land, when it drifts off and is broken into many pieces, and part of this may again join that which is in process of formation.

From the accumulation of snow, such a mass speedily assumes a flat or table-topped shape, gradually increasing in thickness and weight by the congelation of rain, snow, and fogs, which last have no small influence in contributing to the accumulation, as may be supposed, when a few hours suffices to give the rigging and spars of a ship a coating of ice a quarter of an inch thick. Thus masses of a thousand feet in thickness might require but a few years to form. When the icebergs are fully formed they have a tabular and stratified appearance, and are perfectly wall-sided, varying from 180 to 210 feet in height. In some places the United States' Expedition sailed, for more than 50 miles together, along a straight and perpendicular wall, from 150 to 200 feet in height. The icebergs afloat were from a quarter of a mile to 5 miles in length.

In their next stage they exhibit the process of decay, being found 50 or 60 miles from the land, and, for the most part, with their surfaces inclined at a considerable angle to the horizon, caused by their lower portions being unequally abraded by the waves.

By the American observations they can be but little changed by the melting process before they reach the parallel of 60°; and here the remarks of Capt. Sir James Ross as to the zone of equal temperature (39°.5) become important, as it must be after approaching this in their northward course that the warmer surface waters act powerfully on their submerged bases.

During their drift to the northward, on reaching lower latitudes, and as their distance from the land increases, they are found in all stages of decay ; some forming obelisks, others towers and Gothic arches, and all more or less perforated : some exhibit lofty columns, with a natural bridge resting on them of a lightness and beauty inconceivable in any other material. Some apparently retain their original tabular form entire, until they reach a lower latitude, while others have entirely lost it, and have evidently upset or overturned. The sight of one of these immense masses upsetting is a truly grand but exceedingly dangerous spectacle to witness. The noise of the huge mass rending is as loud as thunder or volleys of artillery, and Capt. Boulton, who witnessed one overturning, says, that as soon as the mist occasioned by its fall cleared away, the enormous body rose out of the water in a totally different shape, its original appearance having been very high and square, but was then full twice its former length, besides being low and smooth.

There appears to be a great difference in the movements of these vast masses ; in some years great numbers of them have floated North from the antarctic circle, and at times obstructed the navigation about the capes. The year 1832 was remarkable in this respect ; many vessels, bound round Cape Horn from the Pacific, were obliged to put back to Chile, in consequence of the dangers arising from ice ; while, during the preceding and following years, little or none was seen : this would lead to the belief that great changes must take place in the higher latitudes, or the prevalence of some cause to detach the ice islands from the barrier in such great quantities as to cover almost the entire section of the ocean South of lat. 50° . Taking the early part of the (southern) spring as the time of separation, we are enabled to estimate the velocity with which they move, as they have been met with 600 or 700 miles from the barrier, from sixty to eighty days after that period.

The season of 1839-40 was considered as an open one, from the large masses of ice that were met with in a low latitude, by vessels that arrived from Europe at Sydney ; many of them were seen as far North as 42° S.

The data for the actual drift, as ascertained by the American Expedition, will give an approximation to the velocity of their progress to lower latitudes. On their progress to the South, January 9th, 1840, the first iceberg was met with in lat. $61^{\circ} 8' S.$, lon. $162^{\circ} 32' E.$ The *Peacock* was the first to return, and nearly upon the bank by which the *Vincennes* had gone South ; the last seen by her was in lat. $55^{\circ} S.$ The *Vincennes*, on her return fifty days later, saw them in lat. $51^{\circ} S.$; the *Porpoise*, about the same time, in lat. $53^{\circ} S.$ The observations in the *Vincennes* give the distance of 10° of latitude, or 600 miles, to be passed over in fifty days, or about half a mile per hour, or according to those in the *Peacock*, nearly three-fourths of a mile. Many icebergs were met in lat. $42^{\circ} S.$ by outward-bound ships to Sydney, in the month of November, much worn in appearance, with lofty pinnacles, &c. These, no doubt, had been detached in a former season, and would be naturally, early the next season, drifted by the easterly current as well as westerly wind, and would pursue the direction they give them. They would, therefore, be driven to the N.E. as far as the S.W. winds prevail ; and when these veer to the westward, would receive an easterly direction.

It is when these winds prevail that they are most frequently found by the outward-bound vessels—between the latitudes of 40° and 50° S.

Having thus given some notion as to their general character, we may add some admonitions as to avoiding them in sailing where they may be supposed to exist.

The indications of an iceberg are:—1. A natural effulgence, or *ice-blink*, which frequently renders them visible at some distance, even in the darkest night. At a short distance this effulgence may appear like a white cloud, extending over, or nearly over, the vessel's masts.

2. A considerable decrease in the temperature of the water, as shown by the thermometer, in comparison with the heat of the adjacent sea, and with the air above.

3. The roaring of the sea at the base of a berg, which, except in a steamer with its paddles in action, may be heard by an attentive listener when afar off.

Capt. Weddell recommends that, with a free side-wind, an iceberg or ice island should be passed on the windward side; as by this means the loose ice, which always drifts farthest, is avoided. If the ship, too, be moving with some degree of rapidity, she can avoid these small pieces more readily, as she is then more obedient to her helm. The large ice islands are not the most dangerous to a ship in passing among them, as they can be more easily avoided; on the contrary, it is the small, broken, or detached pieces, level with the water's edge, which are the most mischievous; for, when the wind is high, it is almost impossible to distinguish them from the break of the sea, and yet these small pieces do as much injury to a vessel as large ones, by knocking a hole in her bottom.

Capt. Boulton says that dependence should not alone be placed on what is said to foretell the near approach of icebergs; viz., a white or luminous reflection in the atmosphere over them. This may sometimes occur; but, from strict observation, it is ascertained that it can be discovered only over those which are large and square-topped, besides being invariably covered with snow. The rugged icebergs, and those that have upset, never show themselves in that manner as far as observation enabled to decide. The safest and the best way to discover them is by keeping a good look-out; the eyes constantly tracing and retracing the dark line of the horizon, for ice will always make that part of the horizon, where it is, lighter. By adopting this method they were never mistaken; whereas, if they had been looking aloft, they would have run on many; at the same time one individual should be more particularly appointed to look out for the small pieces.

There is one use in the floating ice; that which is clear and transparent, without flaws or enclosed apertures which will contain salt water, will afford the purest and most delicious water in nature, and is a ready means of adding to the ship's stores. On the flat bergs or field ice pools of this fresh water are sometimes found beneath a scum of ice, and the water will be found perfectly wholesome. Some remarks on this are given in the Appendix.

CHAPTER XXXIX.

PASSAGES.

THERE is one misfortune attendant on the advancement of science, that by following out to minute particulars each special branch of it, the mind is more or less diverted from the simple first principles. The whole tendency of modern research, so indefatigably carried on in the present day, is to multiply the facts attendant on any department of physics; that, instead of the plain matter of fact with which our forefathers were content only to know, we have now such a multitude of phenomena to deal with, that the real question is often subsidiary, or lost sight of. Thus the variation of the compass, the range and hour of the tide, the direction of the progress of winds and currents, have been shown, by multiplied observation and discussion, to be, though more or less simple in the principles in which they originate, most complex in their action, and very different matters to comprehend to what in olden times they were understood to be.

There is no department of practical science to which these remarks are more applicable than in that of navigating a ship. When the rude instruments, and the imperfect resources of the navigator in ancient times are considered, it is rather a matter of wonder that ships were conducted to distant countries at all. But yet a perusal of the accounts of the voyages, made with these means only, will soon convince us that passages were then made fully equal in rapidity to many now undertaken, and, of course, very much in advance of all that might be expected by judging from what knowledge they have left us. Perhaps it was the very imperfection of their means which led them to use diligence and forethought, which are now replaced by more scientific substitutes. One thing is certain, that the simplicity of the various branches of navigation, as then understood, allowed the mariner to comprehend them as a whole better than in the present day, when they are subdivided into such an infinity of minor details, and the great principles of the sphere were then better considered than now, when the universality of charts causes the surface of the earth to be rather viewed as a plane in hydrographical problems. What we would wish these remarks to tend to is, that in former times a principle in navigation, that of sailing on a great circle, was better understood and carried out than in the present day, when it is now being revived as a new subject; and, as the Pacific Ocean is certainly the peculiar sphere for carrying out this principle, we will be the more diffuse on the point.

Very early in the days of navigation, prior to those transatlantic voyages which led to the discovery of America, and the sea voyage to India, the principles of the art of great circle sailing were understood and promulgated. Sebastian Cabot alludes to it in 1495, and it is more than probable that Columbus, Magalhaens, and all the first great navigators were familiar with the subject.* It must

* The first work, apparently, in which it is directly alluded to, is by Pedro Nunez, in 1597. Another is by Pedro de Medina, in 1545, in the Spanish language, but his system was erroneous.

be remembered, that at this time the principles of longitude were not understood or defined, and the charts of the period were merely the result of measurements made by dead reckoning or estimation, a method not in disuse until more than a century later. Almost all the early works give instructions for making these "sea-cards," as well as the rude astronomical instruments, "cross-staffes," "astrolabies," &c., which were then considered sufficient.

A most important epoch in the history of navigation now succeeds. Gerhard Mercator, in 1569, published a universal map constructed on the principle now known by his name. In this the meridians, as well as the latitude circles, are represented by parallel straight lines; and by augmenting both the latitude and longitude in the same proportion, the rhumbs, which in reality are curves or spirals, become represented on it by straight lines also. Mercator does not appear to have exactly comprehended the true principles of his projection. This was reserved for Edward Wright, an Englishman, who correctly described its nature in his work called "*The Haven-finding Art, or the Way to find any Haven or Place at Sea, by the Latitude and Variation, 1599.*" Still there is no mention of longitude as an element of navigation; but this soon was understood, and consequently the simplicity of the sphere was lost sight of in the facilities given by Mercator's or Wright's projections, and the ascertaining of the approximate longitude, although the theory of great circle sailing is of little use without longitude.

Without divesting the mind of the ideas implanted by the consideration of a plane chart, it is somewhat difficult to comprehend the exact nature and practical application of the great circle. It is by this method only that a ship can be directed to her destination as "the crow flies," or as if it were in sight, and the deviation from the systems usually adopted for convenience, from the charts, is greater, according as the distance between the two points is greater. It is most readily comprehended by observing how a thread stretched tightly over an artificial globe cuts the meridians and parallels.

The shortest distance between two points on the surface of a sphere is a portion of an arc of a circle which cuts these two points and would surround the sphere, having the same radius and centre as the sphere itself. The equator is such a *great circle*, thus named because it is the largest circle which can be drawn on the sphere. A meridian is also a great circle, and cuts the equator at right angles. The intersection of two or more of these meridians is at the North and South poles, 90° of arc distant from the equator. By sailing exactly on the equator, or on a meridian, are the only directions in which we shall find the compass to maintain exactly the same direction throughout a passage which shall be the shortest distance between any two points on the earth's surface. In a direct

and was corrected by Martine Cortes (or Curtia), whose work, "*The Arte of Navigation*," was soon after, in 1561, translated into English by Richard Eden, and was long the text-book of British seamen. Numerous other works, in which it is distinctly and correctly described, afterwards appeared, as one by Michael Coignet, of Antwerp, in 1581; an excellent work by Roderick Zamarano, in 1585, &c. That by this time it was thoroughly recognised is evident by a work by John Davis, published in August, 1594, called "*The Seaman's Secrets, wherein is Taught the Three Kinds of Sailing—Horizontal, Paradoxall, and Sailing upon a Great Circle.*" It is also described in Richard Polter's "*Pathway to Perfect Sailing*," about the same time. After this it is found in most of the old works on navigation.

track on any other circle than a meridian or the equator, or due East or West, or North or South, the true bearing of the track will *vary* with each change of place.

This apparent anomaly will be cleared up if we consider what is the real nature of the angle termed the bearing of one point from another, as indicated by the compass or other means. East and West are terms referring to the horizon of a place; but these are only relative to the direction of the true meridian, or the North and South line of such place, and the East and West line cuts this meridian at right angles. But meridians are not parallel on the earth's surface: they, though straight, meet at *different* angles at the poles. Therefore any *straight* line at right angles to one meridian will not, if continued, cut any other meridian at a right angle, because they are not parallel; but the angle will vary more or less from a right angle according to the distance these meridians are apart.

Now in Mercator's projection, and here is the difficulty, the meridians are all made parallel: consequently a straight line intersecting one meridian at any angle will, if continued, intersect any other meridian at precisely the same angle. The straight intersecting line, on the surface of the plane in Mercator's chart, represents a very different thing on the spherical surface of the earth.

But if at any other angle it becomes a rhumb line, and this line transferred to the spherical surface becomes a *spiral*, and continued infinitely would encircle the globe, gradually approaching the pole, which it never reaches. Mathematically this curve, the loxodromic curve as it is called by the older writers, is one of very great complexity, but its simplicity, as practically applied to navigation, has caused it to supersede the apparently more difficult great circle problems.

A great circle may be defined as a circle which divides the earth into two hemispheres, using this last term without reference to its usual meaning, and necessarily may vary in inclination to every possible angle from the equator or any one meridian.

The equator, being a great circle, necessarily bisects every other great circle on the earth, whether at right angles to it, as the meridians, or at any inclination. A great circle, therefore, which is inclined to the equator, which must be the case with those which pass through two places, in different latitudes, passes through two points on the opposite side of the sphere, in directly the opposite latitude and longitude, as it must be bisected by the equator. And there are two points also of more importance in the calculations, and these are the points where the circle attains the greatest amount of divergence from the equator, or the maximum latitude attained in each hemisphere. These two points are called the *vertices** of the great circle.

It follows that the arc of a great circle and the rhumb line differ most widely from each other in high latitudes, and between places nearly on the same parallels. In low latitudes the two curves nearly coincide. The difference, too, is not so great when the two places are on opposite sides of the equator, because the great circle and the rhumb line then intersect each other.

* The Hydrographical Office have published a useful set of tables for facilitating great circle sailing, by Mr. Towson. The construction of these are dependent on the latitude of this vertex, and the angular distance from its meridian, or that which besets the circle at right angles, and with the equator divides it into four quadrants.

The ship, in sailing on a great circle, is always in a *higher latitude* than when sailing on a rhumb line ; hence if both tracks coincide at their extremities, there must be a point in the great circle at which its distance from the rhumb line, measured on a meridian, is greater than anywhere else ; this point is called by Lieutenant Raper the point of *maximum separation in latitude*. It is by means of this point, and the two extremities of the arc, that Lieutenant Raper proposes to lay down, roughly, the great circle course on a chart.

We cannot here give the working portion of the great circle problems ; that must be left to books specially devoted to the subject. It will be found, on referring to them (as in Lieutenant Raper's "Navigation," 3rd edition, pp. 105—113, and pp. 124—126, as well as Towson's "Tables" previously alluded to), that the immense labour, formerly attendant on the necessary calculations, is greatly simplified and reduced ; still much is to be desired before it can be brought to that necessary simplicity to enable the mariner to combine this system with the numerous other considerations which bind him.

There is one advantage in the great circle track, and it is no mean one. The great circle, apparently a circuitous route on the chart, represents a shorter distance than the straight rhumb line. Therefore if a ship be navigated anywhere between the great circle arc and the rhumb, she will still shorten her track. And further, if she assumes a course as much higher in latitude as the great circle course appears to be, she will still not have to sail over a greater space than the rhumb line. This consideration opens a wide field for choice as to a proper parallel to sail upon.

There are very considerable difficulties and apparent contradictions to the usually received notions, in judging as to the best course. A mathematical formula may present the exact directions and extent of an arc of a great circle ; but another point arises in its practical application, that is, where does it lead to throughout its course ? into what latitudes, or into the neighbourhood of what islands or countries ? And again, by assuming a course so very distinct from that which the rhumb course laid down on the Mercator chart, will it, by carrying the ship out of the trade-winds or equatorial currents, or the reverse, neutralize or reverse the advantage which its shorter distance will give ?

If the seaman, instead of using the plane chart, could use the terrestrial globe to guide his course, all difficulty would vanish, and the subject of great circle sailing would become clear to the mind of every one. It is its apparent anomaly with that of Mercator's projection which constitutes all the difficulty.

For example :—From the entrance of the Strait of Juan de Fuca (lat. $48\frac{1}{2}^{\circ}$ N., lon. $124\frac{3}{4}^{\circ}$ W.), Guam, in the Ladrone Islands (lat. $13\frac{1}{2}^{\circ}$ N., lon. $144\frac{3}{4}^{\circ}$ E.), bears about *East*, but the Strait of Juan de Fuca bears *N.W.* from Guam, and these ought to be the respective courses on starting from either position. By Mercator sailing the respective bearings are nearly E.S.E. and W.N.W., which courses, if maintained throughout the passage, will conduct a ship from one point to the other.

Again :—From a position 30 miles South of the Diego Ramirez Islands, to the entrance of Cook's Strait, in New Zealand, the great circle course touches the antarctic circle in about lon. 117° W. Now it is manifest, upon reading the

account of Cook's attempt to penetrate the icy barrier a few degrees to the eastward, in January, 1774, or the voyage of the *Tula*, Capt. Biscoe, in January and February, 1832, that such a course, even in the height of summer, is altogether hazardous and unwarrantable, even if it be at all practicable. A greater difference of longitude than this of course increases the latitude to be attained on a great circle course; as, for example, if the nearest course from Hobarton around Cape Horn will reach lat. 75° , in lon. 136° W., and this is above 8° to the southward of what Capt. Cook was able to penetrate in December, 1773.

It is in the Pacific Ocean, as we have before stated, more particularly, that the principle of sailing on a great circle may be fully carried out. The wide range of its longitudes, and the generally open character of the navigation in almost every portion, make it imperative, in shaping a course from one part of the ocean to another, to consider how far the shortest distance, or that on the arc of a great circle, may prove advantageous in making a passage: whether it will lead into dangerous latitudes, or into a system of adverse winds or currents. It has been the object of the previous pages to point out, imperfectly, it is true, what weather and current drifts may be anticipated; and by a combination of these circumstances, with the direction of the shortest route, the mariner must form his judgment as to the best track to be followed.

In coasting voyages the principle is entirely distinct from that of crossing the ocean. Here the course is governed by a variety of causes, which do not affect a ship in the open ocean. The land deflects the ordinary course of the wind, and the currents, too, assume fresh velocities and new directions: so that each particular locality requires a peculiar system by which the quickest and easiest passages may be made. Thus the navigation from one port to another on the West coast of South America would be attended with considerable difficulty, from the influence that the lofty Andes have in intercepting and modifying the usual trade and other winds, and the direction of the coast, which, offering a barrier in the South to the progress of the current drift, entirely alters its line of progress, if advantage were not taken of these variations from the usual law to expedite the vessel in her course.

In sailing over any considerable amount of longitude, but maintaining the *same* latitude, it is reasonable to suppose that something like uniformity in the direction of the wind will be found throughout the passage; therefore the proper tracks for keeping the ship's head nearest to her destination are simple. But latitudes at all removed from the equator, and the arc of a great circle, is assumed for the proper track; it necessarily follows that *different* latitudes must be entered, and consequently the above remark as to the steadiness of the wind no longer holds good.

But supposing it were possible for a sailing vessel to keep her head always on one course, there would be no difficulty in the matter. But this is known to be impracticable; and, even if it were so, it would not be at all advisable, since sometimes she would make greater progress by keeping away than by sailing close-hauled on the shorter route.

In beating, therefore, against any wind, however little it may drive a ship from her correct course, at each remove from her original track, a fresh one becomes necessary. It is, therefore, desirable that, at frequent intervals, the correct direc-

tion of the ship's destination should be ascertained, and the new course laid down. Thus the deviation from the shortest distance will be reduced to a minimum.

It has been considered that great circle sailing can only be generally useful to a steam vessel, from her capability of maintaining her true course, and that a sailing vessel contending with adverse winds can derive no advantage from following it. But to a sailing vessel it is of very much greater importance than even to a steamer, because by disregarding the true direction, a vessel may choose that tack which leads directly away from the nearest track.

The following example will explain this :—Suppose a vessel quitting the southern part of the North island of New Zealand, say Cape Palliser or Cook Strait, for Valdivia, in South America, with the wind at S. 84° E., and the ship can lay up 65° from the wind. The rhumb course is N. 90° E. The starboard tack is therefore 59° from the rhumb course, and the port tack 71° ; consequently the ship, by Mercator's chart, looks best up to her port on the starboard tack. But the great circle course is S. $47^{\circ} 51'$ E., or only about 30° from the port tack, but 100° from the starboard tack. So that if the chart were the only guide, the starboard tack would be taken; but if the great circle course were taken, the *port* tack would be preferred, and thus after sailing on this tack 500 miles, she would be 456 miles nearer her port. But if the charts be taken as a guide, and the starboard tack run on for 500 miles, the ship would be *four miles further* from her port than when she started.

This is an extreme case as far as navigation is concerned, but it is quite sufficient to demonstrate the point, that a ship following the apparent nearest course by the rhumb and the chart may follow a most circuitous route, and this will be much increased by sailing against the wind. For if a vessel can be kept within 6 points of the wind, she only nears her port 38 miles in every 100 she runs; but if she vary from this only half a point, as is very easily and unwittingly done from unperceived causes, as explained on page 1269, she may only shorten her distance 29 miles in the same run. If a ship could only keep within 7 points, and when she is heavily laden, or in stormy weather, she cannot do more, the advantage would be doubled. Thus great circle sailing is most valuable to sailing vessels under an adverse wind, tenfold that to which a steamer would derive from it, and by applying its principles to the working a passage, the disadvantage it has over rhumb sailing is fivefold in the Atlantic, and twelve times as great in the Pacific.

We need not pursue this, the theoretical part of the question, as to the best direction for quick and easy passages any further. Our practical knowledge on the subject is but very incomplete at present. But it is to be hoped that a few years will so far add to our information, that something definitive may be placed before the world as to how far it is prudent or advantageous to diverge from the beaten track of the rhumb courses across the Pacific, now that the great ocean has become of growing importance to the commercial world.

In the ensuing directions and remarks on passages, derived from various sources, we shall follow the order in which the work itself is arranged; premising that, in too many instances, the information here set forth is but incomplete and unsatis-

factory. But this is the less to be regretted, as the general nature of Pacific navigation is of a simple character, and is not so embarrassed by the various current drifts and the direction of the wind systems as it is in the Atlantic Ocean, where the direction of the coasts and the predominating courses of vessels lie more in the direction of the meridian, and consequently cross these zones of wind and ocean currents.

THE PASSAGE ROUND CAPE HORN.

To all the older navigators the passage round Cape Horn had peculiar terrors; the dreadful account of the sufferings of Anson's crews, and the imperfect acquaintance then attainable of the nature of the iron bound and inclement coast, invested this voyage with so much undefined apprehension, that its safe accomplishment was considered to be the greatest problem in navigation. Now, however, we have nearly perfect charts and descriptions of every feature of the South extremity of America, and thus one cause of anxiety and doubt is removed. The multiplied experience, too, of the numerous scientific voyages which have been made round the cape have instructed us what weather and difficulties are to be encountered, so that the passage may now be undertaken with as little apprehension as almost any other; although all the misfortunes which the old voyagers encountered may be again realized if the necessary precaution be not used, and advantage taken of what modern experience has demonstrated to be necessary for the safety of the ship.

In the first chapter of this work we have given the description of the coasts and islands, with the necessary directions for the anchorages, which may be passed or used according to circumstances, and here we give the general directions for sailing around the cape as derived from various navigators, which instructions must be taken in connexion with what is related in those pages.

The first remarks we shall quote are those which are entitled to the first place and consideration—those by Capt. P. P. King, R.N., whose description of the coasts he surveyed is principally that recited in the former part of this work.

Capt. King says:—Ships bound from the Atlantic to any of the ports in the Pacific will find it advantageous to keep within 100 miles of the coast of eastern Patagonia, as well to avoid the heavy sea that is raised by the westerly gales which prevail to the eastward, and increase in strength according to the distance from the land, as to profit by the variableness of the wind when fixed in the western board. Near the coast, from April to September, when the sun has North declination, the winds prevail more from the W.N.W. to N.N.W. than from any other quarter. Easterly gales are of very rare occurrence, but even when they do blow, the direction being obliquely upon the coast, I do not consider it at all hazardous to keep the land on board. In the opposite season, when the sun has South declination, the winds will incline from the southward of West, and frequently blow hard; but, as the coast is a weather shore, the sea goes down immediately after the gale. In this season, although the winds are generally against a ship's making quick progress, yet as they seldom remain fixed in one point, and frequently shift backward and forward 6 or 8 points in as

many hours, advantage may be taken of the change so as to keep close in with the coast.

Having once made the land, which should be done to the southward of Cape Blanco, it will be beneficial to keep it topping on the horizon, until the entrance of the Strait of Magalhaens be passed.

With respect to this part of the voyage, whether to pass through Strait Le Maire or round Staten Island, much difference of opinion exists. Prudence, I think, suggests the latter; yet I should very reluctantly give up the opportunity that might offer of clearing the strait, and therefore of being so much more to windward. With a southerly wind it would not be advisable to attempt the strait; for, with a weather tide, the sea runs very cross and deep, and might severely injure and endanger the safety of a small vessel, and to a large one do much damage. In calm weather it would be still more imprudent (unless the western side of the strait can be reached, where a ship might anchor), on account of the tides setting over to the Staten Island side; where, if it becomes necessary to anchor, it would necessarily be in very deep water, and close to the land. With a northerly wind the route seems not only practicable, but very advantageous, and it would require some resolution to give up the opportunity so invitingly offered. I doubt whether northerly winds, unless they are very strong, blow through the strait—if not, a ship is drifted over to the eastern shores, where, from the force of the tides, she must be quite unmanageable.

Capt. FitzRoy, whose authority, from his experience, must be very good, seems to think there is neither difficulty nor risk in passing the strait (see page 43, part i.). The only danger that does exist, and that may be an imaginary one, is the failure of the wind. Ships passing through it from the South are not so liable to the failure of the south-westerly wind, unless it be light, and then it will probably be from the N.W., at the northern end of the strait. The anchorage in Good Success Bay, however, is admirably situated, should the wind or tide fail (see page 49, part i.).

In passing to leeward of Staten Island, the tide race, which extends for some distance off Cape St. John, at the N.E. end of the island, must be avoided, otherwise there exists no dangers (see note at page 51, relating to the tide).

The anchorage under New Year's Islands, although it is a wild one and the bottom bad, and the tide very strong, yet offers good shelter from S.W. winds, and might be occupied with advantage during the existence of a gale from that quarter, since it is unfavourable for ships bound round the Horn.

After passing Staten Island, if the wind be westerly, the ship should be kept upon the starboard tack, unless it veers to the southward of S.S.W., until she reaches the latitude of 60° S., and then upon that tack upon which most westing may be made. In this parallel, however, the wind is thought to prevail more from the eastward than from any other quarter. Never having passed round Cape Horn in the summer season, I may not perhaps be justified in opposing my opinion to that of others, who, having tried both seasons, give the preference to the summer months. The advantage of long days is certainly very great, but from my experience of the winds and weather during these opposite seasons at Port Famine, I preferred the winter passage, and in our subsequent experience

of it, found no reason to alter my opinion. Easterly and northerly winds prevail in the winter off the cape, whilst southerly and westerly winds are constant during the summer months; and not only are the winds more favourable in the winter, but they are moderate in comparison to the fury of the summer gales (see page 41).

Having passed the meridian of Cape Pillar, it will yet be advisable to take every opportunity of making westing in preference to northing until reaching the meridian of 82° or 84° , which will enable a ship to steer through the north-westerly winds that prevail between the parallels of 50° and 54° .

With respect to the utility of the barometer as an indicator of the weather that is experienced off Cape Horn, I do not think it can be considered so unfailing a guide as it is in the lower or middle latitudes. Capt. FitzRoy, however, has a better opinion of the indications shown by this valuable instrument: my opinion is, that although the rise or fall precedes the change, yet it more frequently accompanies it. The following sketch of the movement of the barometer, and of the weather that we experienced, may not be without its use.

Being to the North of Staten Island for three days preceding full moon, which occurred on the 3rd April, 1829, we had very foggy weather, with light winds from the eastward and northward, causing a fall of the mercury from 29.90 to 29.56. On the day of full moon the column rose, and we had a beautiful morning, during which the high mountains of Staten Island were quite unclouded, as were also those of Tierra del Fuego. At noon, however, a fresh gale from the S.W. set in, and enveloped the land with a dense mist. No sooner had the wind changed, than the mercury rose to 29.95, but fell again the next morning; and with the descent the wind veered round to, and blew strong from, N.W., with thick cloudy weather and rain, which continued until the following noon, when the wind veered to S.W., the barometer at 29.54, having slightly risen; but after the change it fell, and continued to descend gradually until midnight, when we had a fresh gale from W.S.W. When this wind set in, the mercury rose, and continued to rise, as the wind veered without decreasing in strength to S.S.W., until it reached 29.95, when it fell again, and the weather moderated, but without any change of wind. During the descent of the mercury, the sky with us was dull and overcast, with squalls of wind and rain, but on shore it seemed to be very fine sunshiny weather.

The column now fell to 29.23, and during its descent the weather remained the same, dull and showery; but as soon as the mercury became stationary, a fresh breeze set in from the southward, with fine weather.

After this to new moon the weather was very unsettled, the wind veering between South and W.S.W.; the barometer rising as it veered to the former, and falling as it became more westerly; but on no occasion did it precede the change.

The mean height of the barometer is about 29.5.

The mercury stands lowest with N.W. winds, and highest with S.E.

With the wind at N.W. or northerly the mercury is low; if it falls to 29 inches or 28.80, a S.W. gale may be expected, but does not commence until the column has ceased to descend. It frequently, however, falls without being followed by this change. In the month of June, at Port Famine, the barometer fell to 28.17,

and afterwards gradually rose to 30·5, which was followed by cold weather, in which the thermometer stood at 12°.

This concludes the remarks of Capt. King. To these may be added those of his coadjutor, Capt. FitzRoy. At the commencement of chapter ii. (pages 39—43, part i.) we have given some general remarks by the latter on the outer coast of Tierra del Fuego, and the ensuing may here be included.

Capt. *FitzRoy* says:—"In going westward, Capt. King recommends keeping near the eastern coast of Patagonia, and after passing Staten Island, if the wind be westerly, the ship should be kept upon the starboard tack, unless it veers to the southward of S.S.W., until she reaches the latitude of 60° S."—(Vol. i. pp. 464-5.)

I do not think keeping near the eastern coast of Patagonia of importance to a large or strong vessel; smoother water is found near that coast, it is true, but currents set to the northward along shore more strongly than in the open sea. Icebergs, however, are never found in sight of that land, though they have been met farther eastward, to the North of 40° S. lat. Instead of going into 60° S. lat., I should prefer working to windward, near the shore of Tierra del Fuego, through Nassau Bay, where anchorages are numerous and easy of access.

In Orange Bay, or farther South, a ship may await a favourable time for making a long stretch to the westward; if foiled in one effort she may return, or seek for anchorage under Noir Island, in Euston Bay, or elsewhere, until a better opportunity occurs. To make westing ought to be the principal object, in my humble opinion, till the meridian of about 82°* is reached. Icebergs are not found near the land of Tierra del Fuego, but they are frequently met with at a distance from it. By adopting this plan of passing through Nassau Bay, or near Cape Horn, much labour and damage may be avoided, because a ship may lie quietly at anchor during the worst weather, and be ready to profit by any advantageous change.

Capt. *Basil Hall*, R.N., in the Appendix to his most interesting "Extracts from a Journal, &c.," gives the following, from his experience in the *Conway*:—

In the passage from Monte Video to Valparaiso (November 11, to December 19, 1820, or thirty-eight days), both favourable weather and circumstances were met with. With the exception of a gale from South, on November 18, in lat. 46½° S., lon. 57° W., and another short one from West on the 12th of December, after rounding the cape, in lat. 51° S., lon. 82° W., the weather was uniformly moderate. A north-westerly breeze, with fine clear weather, carried us to 54° S., when we got N.N.E. and North by West winds, which took us through the Straits of Le Maire.

We rounded Cape Horn on the 26th of November, fifteen days from the river, with a fresh N.E. westerly breeze. This speedily shifted to the N.W., and then S.W., and again to West, and W.S.W.; so that we made little westing till we reached 61½° S. on the 1st of December. The weather was always moderate, with drizzling rain, and occasional fogs, and a high swell from S.W. Between the 2nd and 3rd of December the wind drew to the northward, with a thick fog.

* Eighty degrees will be far enough West for a fast-sailing ship; but 85° will not be too westerly for a dull sailer.

Next day it came to the S.W., with sleet squalls, and a thick haze. This wind gradually hauled to the northward of West, with hail squalls. An inspection of the track will show how uniformly the winds between 60° and $51\frac{1}{2}^{\circ}$ S. gradually drew from the S.W. to westward, then to N.W., and so to the northward, and always squally, with hail and sleet. In $51\frac{1}{2}^{\circ}$ S. we had a gale of nine hours from the West, with squalls of hail. This wind, however, instead of drawing to the N.W. and northward, as it had been wont to do in the six preceding degrees South of us, now hauled W.S.W., and blew fresh, with constant squalls, till we had run on a North by West course (by compass) nearly to 42° South. The wind, then, after a short calm, came to the eastward, and drew round gradually to S.S.E., where it remained steady and fresh till we made the land to the southward of Valparaiso on the 19th of December. We had light airs from the northward in the middle of the day, which carried us into the harbour.

The highest South latitude to which we reached was $61\frac{1}{2}^{\circ}$, being then in 75° West longitude. This was in the evening of the 1st of December, 1820. We had then a fresh breeze from the N.W. by West, with a thick drizzling haze. The barometer stood at 29.34, and the thermometer at 41° . The farthest West to which we went was $84\frac{1}{2}^{\circ}$, in lat. $57^{\circ} 45'$ S., on the 7th of December, the wind very light from the westward, barometer 28.66.

When the prevalence of strong N.W. winds between 50° and 54° S. is taken into consideration, it will probably be advisable to go, at least as far West as 84° , in order to make a fair wind of the north-westers, when not too strong, to admit of carrying sail.

From the best information respecting the weather off the cape, there seems reason to believe that the hardest gales prevail near the land, and that the chance of good weather and of easterly winds is at least as great at a considerable distance off shore. A ship, on meeting westerly winds, therefore, ought perhaps to stand on to the southward as far as 62° or 63° , and be indifferent about northing till between the longitude of 80° and 85° , after which there will be little difficulty in proceeding, although there must always be considerable discomfort in passing between 55° and 50° S., where the north-westers prevail, with a high sea.

I am at a loss what to think of the utility of the barometer on this passage. Off Cape Horn, on the 26th of November, in lat. $56\frac{1}{2}^{\circ}$ S., it stood at 29.55; on reaching 60° S., it had fallen to 29.13: the wind to the westward, and a thick fog; but no bad weather followed. From the 1st to the 2nd, when we were in lat. 61° S., it ranged between 29.50 and 29.30, with light winds from the north-westward, and drizzling rain. During the next day, when we were running nearly on the parallel of 61° S., the mercury fell from 29.30 to 28.84, with a thick fog, and a moderately fresh breeze from the N.W. On the wind coming from the south-westward, it rose slowly to 29.95; the weather moderate, with slight hail squalls and clear weather. It again fell, as the wind shifted to the northward, N.E. and E.N.E., and stood at length at 28.60, which is the lowest point it reached. This was in the evening of the 4th, in lat. 59° S., and lon. nearly 8° W., the wind at E.N.E., moderate and cloudy weather. Fresh southerly, south-westerly, and west-south-westerly breezes followed, and hard squalls, with sleet, but no gale of wind. It remained below 29 inches till we had passed the

latitude of 57° S., and afterwards rose very gradually, till, having reached the latitude of 56° S., on the 16th of December, it stood at 30 inches. It gave no warning of the approach of the gale on the 11th, but fell during its continuance nearly to 29 inches from 29.28, which it had stood at before.

From a consideration of these circumstances, it is to be apprehended, that the barometer, which in middle latitudes is so useful an instrument in foretelling changes of weather, may sometimes fail us in very high, as it almost always does in very low, latitudes. On the return passage round Cape Horn, on the 15th of August, 1822, during the opposite season, the same thing was observed, viz., a fall so low as 28.88, in lat. $56\frac{1}{2}^{\circ}$ S., which was not followed by any bad weather. The wind was then N.W. and moderate. Perhaps it is affected in high latitudes by fogs and rains in a greater degree than it is in middle latitudes, where I have not observed that anything but winds materially influenced its movements.

On the passage from the East in summer (December), the lowest temperature we observed off Cape Horn was 39° . On the return passage in winter (August), it never fell below 40° , till off the Falkland Islands, when it was one day as low as 35° .

We observed no current off the cape greater than what might be ascribed to error in the estimation; neither have I yet heard any well-established facts respecting the currents off Cape Horn, more than what must always attend hard gales.

A considerable difference of opinion prevails as to the fittest time of the year for making a passage round Cape Horn from the eastward. There seems good reason to believe, that in winter, when the sun is to the northward of the equator, the chance of easterly winds is the greatest; and many persons are of opinion, that the westerly gales are then neither so violent nor so lasting as during the months that the sun is to the southward of the equator. Admitting these circumstances to be as stated, there remain two very serious objections to the winter season: first, the length of the nights; and, secondly, the presence of ice islands. In a tempestuous and frigid latitude, the absence of daylight always augments, in a very serious degree, the difficulties of navigation; but when the formidable danger of icebergs is added, there can be little further question, I think, as to which season is preferable. All accounts seem to agree that it is during the winter and spring months, July, August, and September, that the ice is most generally met with; and as the masses in which it floats about are sometimes only a few feet above the water, and such as cannot possibly be distinguished at night, the risk which ships run in winter months is very great. Sometimes it is met with in fields, which embarrass ships exceedingly; and since the opening of the commerce with the shores of the Pacific has multiplied the number of vessels navigating those seas, many accidents occur every season. It will be seen that on our return we met the ice both in large and small islands in August, 1822; and several ships returned to Rio about the same time, after running against the ice, dismasting themselves, and sustaining other damage.

With the view of preserving the order of our work we have altered the arrangement of Capt. Hall's remarks, and now give his observations on his return passage round the cape. The *Conway* left San Blas, on the Mexican coast, June 15,

1822, and reached Rio Janeiro September 12th, a passage of eighty-nine days. From $49\frac{1}{2}^{\circ}$ S. and 82° W., to 55° S. and 78° W., we had fresh N.N.E., N.N.W., and N.W. winds. Just as we were about to haul up to round the cape on the 12th of August, the wind came from N.E. (by compass, or about E.N.E., *true*), which obliged us to go as far as $57\frac{1}{2}^{\circ}$ S., before the wind shifted to West and N.W. We passed out of sight of Cape Horn on the night of the 14th of August, just two months from San Blas, strictly sixty and a half days, the navigable distance being 6,000 miles. From the meridian of Cape Horn to that of the Falkland Islands, we retained the N.W., and latterly the S.W. winds. It then fell calm, after which we had S.E. and S.S.E. breezes, with snow showers (the first we had seen), nearly as far as lat. 40° S. In the Pacific, between 50° and 55° , we had hard breezes, with rain, and a considerable sea, but not such as to prevent our scudding with ease. During all the passage off the cape, we had fine weather, with smooth water, and a mild climate, that is to say, the thermometer was not below 39° . Off the Falkland Islands, with an E.S.E. wind, it fell to 35° . This temperature seemed cold to persons recently come from a residence of more than six months in one of the hottest parts of the world, but, upon the whole, the season was finer than that of the correspondent North latitude.

When off the cape, in lat. 57° S., and lon. 69° W., we fell in with four ice islands: two of these were very high and long; the other two were about 20 yards long, and as they floated not more than 10 or 12 feet out of the water, would, in all probability, not have been seen at night till too near to be avoided. Next day an immense island was seen, which could not have been less than 200 or 300 feet high, and a quarter of a mile long. This was in lat. $56\frac{1}{2}^{\circ}$ S., and lon. 65° W. Some days afterwards, we fell in with an American whaler which had passed more to the southward in 58° , where he not only met with innumerable ice islands, but with an extensive compact field as far as the eye could reach. He found himself in the morning almost beset, and it cost him nearly twenty-four hours beating among the floating pieces and icebergs before he was clear of them. I examined his chart, on which his track was laid down with every appearance of exactness; the ice and ice islands were severally sketched in a business-like manner on the chart. The high island which we saw on the morning of the 15th was probably one of the same group, and the smaller ones fragments.

There are few things in navigation more dangerous than one of these low ice islands in a dark night, when blowing hard, and with a high sea; all circumstances which unfortunately are likely enough to come together at this particular season, when the ice is most frequently observed to be floating about off Cape Horn. In bad weather it might be prudent to lie-to; but in fine weather, although dark, as it was with us, a leisurely course may be followed, provided uncommon vigilance be used. On this occasion I thought of a precaution, which it may perhaps be worth while stating. Having reefed the courses, that the officer of the watch might have a free view, the yards were braced sharp up, bow-lines hauled, and everything prepared for tacking, and always kept so at night, from whatever direction the wind might blow. On an ice island being seen ahead, and near us, in the case of the ship being by the wind, the helm being put down, she would readily come about: if off the wind, she would come to,

with the sails so trimmed as to allow her sailing past the danger ; or if this could not be, still she would be more ready to come about, and certainly be more manageable, in all respects, than if the yards had been in any other position.

Capt. *James Weddell*, a master in the British Royal Navy, has given some excellent observations on the passage round Cape Horn. These remarks are not the result of the single voyage which his book records, but the experience of five years' navigation in those seas ; "and having performed a passage of 26° of longitude direct to the westward, about the parallel of Cape Horn, during the stormy month of *April*, I am fully acquainted with the perils and the conveniences of this navigation, and can offer my experience with the confident expectation of its being found useful."—(P. 6.) The following are his observations on the navigation round Cape Horn, &c. :—

Many commanders of ships, who have been successful in making a passage round Cape Horn to the westward, have treated with unmerited derision the accounts given by Commodore Anson of this navigation.

I am quite satisfied, from my own experience, that the month of *March* might be productive of all the distresses described by the journalist. Capt. Porter, who passed the cape in the American frigate *Essex*, in *March*, 1814, says :— "Indeed our sufferings, short as has been our passage, have been so great, that I would advise those bound to the Pacific never to attempt the passage of Cape Horn, if they can get there by any other route."

The difficulty, however, in making this passage, is removed by choosing the proper seasons, which, when attended to, must at least save much time and wear and tear of the ship. In the beginning of November the winds begin to draw from the northward, and continue to be frequent until about the middle of February, when they shift into the S.W. quarter ; during these months the westerly winds are not lasting, hence the passage may be easily effected. From about the 20th of February to the middle of May, the winds are generally between S.W. and N.W., and blow with great violence. During this interval no ship need expect to make a passage round the cape that is not well equipped in every respect. From the middle of May to the end of June the winds prevail from the eastward, with fine weather. During these six weeks a vessel may round the cape, in sight of the Diego Ramirez. In July, August, September, and October, the winds prevail again between S.W. and N.W. ; but August and September are more particularly tempestuous. In regard to the route which ships should take round the cape, much depends on the season of the year, as relates to the force of the prevailing westerly winds. I prefer at all times passing to the westward of the Falkland Islands ; and in the summer season to pass through Strait Le Maire, as it saves 50 or 60 miles of westing, and can be attended with no risk if you have sufficient daylight to see to run back through the straits, in the event of being caught with a southerly gale at the southern entrance.

Cape Horn lies from Cape Good Success S.S.W. $\frac{1}{4}$ W., distant 31 leagues. In this line lies Barnevelt's Island. If intending to touch at an anchorage about Cape Horn, a S. by W. $\frac{1}{4}$ W. course through the night will but well avoid the indraught which sometimes sets to the N.W. among the islands at the entrance to the Nassau channel ; if not intending to go into harbour, a South

course from Strait Le Maire to the South of Cape Horn, edging to the westward, and passing Diego Ramirez on the South side, at the distance of a few miles, is the most advisable track. Ships working to the westward off the cape in the summer season, should stand towards the shore of Tierra del Fuego in the evening, when the wind will often be found to draw from the northward off the land, and western again in the morning.

These observations refer to the seasons I have recommended for passing the cape; but during those months which are attended with the most violent gales, viz., March, August, and September, I have only to recommend the advice given by Commodore Anson, that of standing to the southward in the latitude of 60°, when the sea is more regular, and the winds more equal. If, however, a ship be making a coasting passage, and should require to anchor, the following instructions may be found useful. The prominent situation of Cape Horn at once points out the neighbouring Bay of St. Francis, in which are two harbours, perfectly safe for vessels of any draught of water. Their approach is so easy as to make it necessary only to remark, that Wigwam Cove is the second opening on the West side of the bay, and by steering along the western shore, about N. by E., it will be easily found.*

The soundings round the Diego Ramirez are regular, and at the distance of half a mile from the southern island. On the East side is a depth of 30 fathoms, with a bottom of fine green sand. The tides here are regular when the winds are moderate; and by the report of my officers, who were several days on the island, it is high water on full and change at 2^h 15', and rises about 5 feet. The flood tide, contrary to former reports, was observed to run to the N.E., and it evidently runs to the eastward between many of the main islands. The currents, or those streams which are propelled by prevailing winds, interfere so much with the natural tendency of the tide, that great doubt is created in regard to the proper direction of it.

Winds and Weather.—The heaviest and most lasting gale that blows in the neighbourhood of Cape Horn is from South, occasionally shifting a point or two each way. This gale I have frequently known to come on in a squall, and continue, in the tempestuous months, to blow for thirty-five to forty hours together. The southern horizon, filled with rising clouds, heavy and white, in a blue sky, is a sure indication of a lasting gale, with snow squalls. A complete calm generally follows this wind, which, however, is not very frequent. The wind at East invariably rises light, and gradually increases to a strong breeze; but when it veers from East to S.E., a strong gale may generally be expected, with snow or rain squalls.

A North gale also comes on gradually; and towards the end, which is generally about thirty hours, it draws from the N.W. and brings rain, and presently shifts into the S.W., without ceasing to blow, and continues from that point twelve or fifteen hours. All gales are of shorter duration in summer than in winter; and it may be remarked, that a vessel may anchor anywhere for shelter from a S.W. wind,

* We do not here quote the directions given by Capt. Weddell, as the late survey by Capt. King will supersede the necessity of so doing. Suffice it to say, that Capt. Weddell recommends *Wigwam Cove*, as above (which is described in part i. page 55); *Mazwell's Harbour* (page 56); *Indian Cove*, in *New Year Sound* (page 58); and *Clear Bottom Bay* (page 58).

without the fear of its shifting to the northward; but the contrary must be guarded against, as the wind shifts from N.W. to S.W., continuing to blow with great violence.

In the most windy months N.W. gales blow with great force, when they rapidly rise near that point, and generally last twelve or fourteen hours. To the S.W. of Cape Horn they blow with less violence, but are more durable. In the summer season the winds between S.W. and N.W. frequently blow in gusts of six or eight hours' continuance, at the strength of a brisk gale; it then becomes moderate, and the wind inclines to the northward.

In the summer I have observed the coincidence of fine weather with light easterly winds at the time of the new moon, when in South declination, and at the time of full moon to blow strong from the northward. There being many exceptions, however, to the natural action of the wind, produced by localities, I have found it impossible to systematize the indications of the winds and weather satisfactorily. We must, therefore, rest contented with an approximation to certainty in these matters.—(A Voyage to the South Pole, Appendix, pp. 231—238.)

Remarks by Capt. F. W. Beechey, R.N.—About the parallel of Cape St. John we encountered strong S.W. winds with long heavy seas, and stretched to the southward to lat. $58^{\circ} 2'$ S., *regretting that we had not passed inside the Falkland Islands*; as, in that case, we should have been nearly a day's run farther to the westward before we encountered these adverse winds. After two days the wind veered to S.S.W., and blew hard, but the sea was not high. We now stood to the N.W., and on the 17th, in lat. $56^{\circ} 21'$ S., lon. $61^{\circ} 51'$ W., had a few hours' calm. This was succeeded by a breeze from the southward, and continued moderate, with fine weather and a smooth sea; and the next day, having carried us 123 miles, we made Cape Horn, 14 miles distant on the lee beam, bearing N. 2° W., *true*; the wind still from the southward.

Between Cape Horn and Diego Ramirez we had soundings with 45 fathoms rock, and 60 fathoms sand; and afterwards from 84 to 60 fathoms gravel, coarse and fine sand, and some coral. That night we passed to the northward of Diego Ramirez at 9 miles distant, not having less than 66 fathoms on a bottom of coarse sand. The following morning the Isles of Ildefonso bore N. 5° W., *true*, 9 miles, and we had 73 fathoms, fine sand; and at noon York Minster, at the entrance of Christmas Sound, bore N. 37° E., *true*, 19 miles, 82 fathoms, coral and stones. Not liking to range the shore of Tierra del Fuego so close during the night with a southerly wind, we tacked; and, with the wind still at S.S.W., stood for thirty-six hours to the S.E. into the meridian of Diego Ramirez; and, when 36 miles South of it, we again kept W. by S., with the wind at S. by W. We stood on, and had light winds, fine weather, and a smooth sea, until the 24th, when there was a calm for twelve hours, with a little swell from N.E. On the 25th, early, we got a north-easterly wind, which commenced with fine weather and smooth water; and at noon on the 26th, carried us to the 79th meridian and 53rd parallel of latitude, when we considered ourselves round the Horn. In this situation we were 143 miles West of Cape Pillar; having numbered exactly fourteen days from the time at which we were 100 miles due East of Staten Land. We passed Cape

Horn on one Sunday, and on the following crossed the meridian of Cape Pillar. Our greatest South latitude in the whole passage was $58^{\circ} 2' S$. The gales of wind which we experienced were attended with a long swell, that by no means strained the ship, and we did not see a particle of floating ice.

With regard to the best time of the year for rounding Cape Horn there is a great difference of opinion, as in the same months both good and bad passages have been made; but I should certainly not select the winter time if I had my choice. Independently of the cold, which during gales of wind is severely felt by a ship's company necessarily wet and exposed, and the probability of meeting with floating islands of ice, surely the long nights, as Capt. Hall has justly observed, must augment, in a serious degree, the difficulties of the navigation.

From the passage of the *Blossom*, a preference might be given to the month of September; but in the very same month Capt. Falcon, in the *Tyne*, had a long and boisterous passage. I concur in opinion with Cook, Pérouse, Krusenstern, and others, in thinking there is no necessity whatever for going far to the southward, and I should recommend always standing on that tack which gained most longitude, without paying any regard to latitude, further than taking care to keep South (say a degree) of Cape Horn. With a N.W. wind I would stand S.W., and with a S.W. wind N.W., and so on. If there were a doubt, I should give the preference to the southern tack, unless far advanced in that direction. We did not find the strongest winds near the land, but on the contrary; and I am of opinion that here, as is the case in many other places, they do not blow home; and that within 30 miles of the land the sea is broken by the inequality of the bottom. There is, however, great objection to nearing the land eastward of Cape Horn, in consequence of the velocity with which the current sets through the Strait le Maire, particularly with a southerly wind. This does not obtain to the westward of Diego Ramirez, in which direction I see no objection to approaching the coast within 40 or 60 miles. Cook ranged this shore very close in December, and on more than one occasion found the current setting off shore, and at other times slowly along to the S.E.

In the first part of this passage the currents ran to the N.W., but after passing the latitude of $40^{\circ} S$., they set to the eastward; and when we arrived off Cape Horn the ship was $S. 40^{\circ} E.$, 116 miles of her reckoning.

While we were in the neighbourhood of Diego Ramirez there was little or no current, but to the westward it ran to the W.N.W. It, however, soon after changed, and on our arrival off Concepcion the whole amount of current was $N. 49^{\circ} E.$ 147 miles. In rounding Tierra del Fuego, with a southerly wind, full 4 points must be allowed for variation and current. For in this high latitude there will, in most ships, be found 10 or 12 degrees more variation with the head West than East: and though the true variation be but $24^{\circ} E.$, at least 29 or 30 degrees must be allowed going westward.

We found the barometer in this passage an invaluable instrument; upon no occasion did it deceive us. In passing these latitudes my attention was drawn to the changes in the temperature of the water, which I usually found to precede a shift of wind from South to North, and *vice versa*, even before that of the temperature of the air.

On the home passage of the *Blossom*, June 22, 1828, the ship had an easterly wind, which veered to S.E. and drove her away to the latitude of $56^{\circ} 18' S.$, and longitude $75^{\circ} W.$, when she encountered S. by E. winds, which carried her past Cape Horn on the 30th. The winds were now fair; but off the Falkland Islands they were variable, until they settled in the E.S.E. quarter. With this she advanced to 35° North, when she encountered N.E. and N.W. gales, with heavy cross seas, and then several pamperos, which were attended with vivid lightning. We afterward, says Capt. Beechey, made progress to the northward, and arrived at Rio Janeiro on the 21st of July.

In this passage, which was made in the depth of winter, the greatest cold was 21° . From Cape Horn to the Falkland Islands we had thick showers of snow, and had we been bound the opposite way, I have no doubt we should have felt the weather severely. The barometer, as on the former occasion, proved an invaluable monitor. From the time we quitted Mas-a-Fuera until we were off Staten Land, the winds were advantageous for making the passage to the Pacific, and so far they favour the opinion of the winter time being the most desirable for this purpose. The current in this passage ran to the S.E. to lat. $46^{\circ} S.$, then North two days, and from 48° to $57^{\circ} S.$, between N.W. and S.W., at the rate of 13 miles a day. From lat. $57^{\circ} S.$, and lon. $68^{\circ} W.$, they ran to the N.E. until we passed the cape, and then westerly and north-westerly to the Falkland Islands. Off the River Plata they ran to the S.W. and South. On our arrival at Rio Janeiro the whole effect of the current from Coquimbo was S. $62^{\circ} W.$, 82 miles.

From the experience of these two passages round the Horn, I am of opinion that a ship bound to the Pacific should pass inside the Falkland Islands and round Staten Land as closely as possible, as she will most likely encounter S.W. winds directly the Pacific is open. A N.W. wind off the Falklands will, I think, generally veer to West and S.W. on approaching Staten Land. With S.W. winds off Staten Land, nothing is left, of course, but to stand to the southward. I should not, however, recommend keeping this board longer than to get an offing, except westing was to be made by it; and if not, I would go about directly a mile of longitude was to be gained on the in-shore tack; avoiding, however, a near approach to Tierra del Fuego, eastward of Cape Horn, on account of the N.E. set through Strait le Maire, with southerly winds. I see no good reason for going to a high southern latitude, if it can be avoided without loss of longitude. With regard to the fact, that gales of wind are stronger near the land, I own I cannot concur in such an opinion. On a comparison of the *Blossom's* passage out with that of a brig commanded by a Lieutenant Parker, which rounded the Horn at the same time, it appeared that whilst she was experiencing strong winds and heavy seas, which washed away some of her boats, the *Blossom*, close in with the land, had fine moderate weather, and no other indication of the gales the *Hellespont* was encountering than by a long southerly swell setting upon the shore; and that the *Blossom* had the advantage of a westerly current, while the brig was put back 20 miles daily by one in the opposite direction.

With regard to passing inside or outside the Falkland Islands, I think the latter preferable, especially in winter, as the winds sometimes hang in the eastern

quarter at that period, and are apt to run a ship in with the River Plata.— (Appendix, pp. 632—634.)

These extracts appear to us to include all the most important observations that have been made, and it is, therefore, unnecessary to multiply them, as might easily be done. We therefore pass on to the observations on entering or leaving the Pacific by the Strait of Magalhaens.

THE STRAIT OF MAGALHAENS.

The ample description of the physical features of this remarkable strait, by Capt. King, are given in the first chapter of this work. The following general directions are by the same officer :—

The difficulties that present themselves to navigators in passing round Cape Horu, as well from adverse winds as the severe gales and heavy sea that they are exposed to, are so great, that the Strait of Magalhaens has naturally been looked to as a route by which they may be avoided. Hitherto no chart has existed in which much confidence could be placed ; but by the present survey, the navigation through it, independent of wind and weather, has been rendered much easier ; since a correct delineation of its shores, and plans of the anchorages, have been made ; and sufficient descriptions of them have been given to assure the navigator of his place, and furnish him with advice as to his proceedings. The local difficulties, therefore, have been removed ; but there remain much more serious ones, which I should not recommend a large, or even any but a very active and fast-sailing, square-rigged vessel to encounter, unless detention be not an object of importance.

For a square-rigged vessel bound through the strait, the following directions will be useful :—

In the eastern entrance, the winds will frequently favour a ship's arrival off the First Narrow ; where, if she selects a good anchorage on the bank which bounds the northern side of the channel (see part i. pages 5, 6), she may await an opportunity of passing through the First Narrow and of reaching Gregory Bay ; where also a delay may safely be made for the purpose of passing the Second Narrow, and arriving at the neighbourhood of Cape Negro ; at which place the difficulties and dangers of the eastern entrance cease.

The dangers being carefully placed on the chart, and now sufficiently described, nothing need be repeated here ; and, indeed, much must be left to the judgment and discretion of the navigator.

The passage of the First Narrow, the anchorage to the eastward of, and in, Gregory Bay, the passage of the Second Narrow, the anchorage to the North of Elizabeth Island, and the passage round its South side, are described on pages 6—10.

The tides answer best for vessels entering the strait at the period of full and change of the moon, since there are two westerly tides in the day. In the winter season, if the morning tide be not sufficient to carry a vessel through the First Narrow, she may return to Possession Bay, select an anchorage, and be secured again before night ; or, in the summer, if she has passed the Narrow, and

enabled to anchor for the tide, there will be sufficient daylight for her to proceed with the following tide to Gregory Bay, or at least to a safe anchorage off the peaked hillocks, on the North shore (page 7).

I have twice attempted to pass the First Narrow, and been obliged to return to the anchorage in Possession Bay (see page 5); and twice I have passed through it against a strong breeze blowing directly through, by aid of the tide, which runs, in the narrower parts, at the rate of 10 or 12 miles an hour. When the tide and wind are opposed to each other, the sea is very deep and heavy, and breaks high over the decks; it is, therefore, advisable to close reef, or lower the topsails on the cap, and drift through; for the tide, if at the springs, will generally be sufficient to carry a ship to an anchorage, although not always to one that it would be safe to pass the night at. On this account it would be prudent to return; for, although the holding ground is exceedingly good, yet, to part in the night, or drift towards or through the Narrow, could scarcely happen without accident.

In leaving the anchorage in Gregory Bay, attention must be paid to the tide, which continues to run to the eastward in the Second Narrow three hours after it has commenced to set to the S.W. at the anchorage (see page 8).

With a leading wind through the Second Narrow, a ship will easily reach an anchorage off Laredo Bay (page 10); but, if the tide fails upon emerging from it, she should seek for a berth in the bay to the North of Elizabeth Island (page 9), as near to the island as possible, but to the westward of its N.E. end, to be out of the influence of the tide. The depth of water, however, will be the best guide.

Directions to pass round the South side of Elizabeth Island are given at page 9; and as this part offers some dangers, the chart and the description should be carefully referred to.

The only advice that seems wanting to improve the directions of the coast from this to Port Famine is, with a south-westerly wind, to keep close to the weather shore, in order to benefit by the flaws down the valleys; but this must be done with caution, in consequence of the squalls off the high land, the violence of which, to a person unaccustomed to them, cannot be well imagined.

The fourth section, from pages 15—17, part i., gives an account of the anchorages between Port Famine and Cape Froward; of which the only convenient one for a ship is St. Nicholas Bay (page 17), and to which, if defeated in passing round the cape, a ship had better return; for it is easy to reach as well as to leave, and extremely convenient to stop at, to await an opportunity of proceeding.

From Cape Froward to the westward, unless favoured by a fair wind, it is necessary to persevere and take advantage of every opportunity of advancing step by step. There are several anchorages that a ship may take up, such as Snug Bay, off Wood's Bay, near Cape Coventry, in Fortescue Bay, Elizabeth Bay, and York Roads. These are described between pages 23 and 27. To the westward, in Crooked Reach, the anchorages are not so good, and, excepting Borja Bay (page 29), none seem to offer much convenience. Borja Bay, however, is well calculated to supply the deficiency, although for a square-rigged vessel there must be some difficulty in reaching it.

Long Reach is both long and narrow, and ill supplied with anchorages for a

ship; such as they are, Swallow Harbour, Playa Parda, Marian's Cove, and Half Port Bay, seem to be the best (pages 30 and 32). In thick weather, although the channel is very narrow, yet one side is scarcely visible from the other, and the only advantage it has over other parts of the strait is the smoothness of the water. In Sea Reach there is a heavy rolling swell, with a short and deep sea, which renders it very difficult to beat to windward (page 33).

Tamar Harbour (page 34), Valentine Harbour (page 36), Tuesday Cove (page 37), and the Harbour of Mercy (page 37), are the best anchorages; the latter is very convenient to occupy, to await an opportunity of sailing out of the strait.

In the entrance the sea runs very heavy and irregularly during and after a gale; so that a ship should not leave her anchorage in the Harbour of Mercy without a fair or a leading wind to get her quickly through it.

For small vessels, particularly if they be fore-and-aft rigged, many, if not all, of the local difficulties vanish; and inlets, which a ship dare not or cannot approach, may be entered with safety, and anchorage easily obtained by them. A large ship will perhaps be better off in entering and leaving the strait where there is open space and frequently a heavy sea; but, for the navigation of the strait, a small vessel has considerably the advantage. She has also the opportunity of passing through the Cockburn Channel, should the wind be north-westerly, which will very much reduce the length of the passage into the Pacific.

One very great advantage to be derived from the passage through the strait is, the opportunity of obtaining as much wood and water as can be required, without the least difficulty; another great advantage is that, by hauling the seine during the summer months, from January to May, at the mouth of the river, or along the beaches in Port Famine, at the first quarter flood, a plentiful supply of fish may be obtained. Excellent fish are also caught at the anchorage with the hook and line, at all seasons, early in the morning or late in the evening. Fish may also be obtained with the seine at any other place where there are rivers. Fresh-water Bay and Port Gallant are equally productive. On the outer coast of Tierra del Fuego an excellent fish may be caught in the kelp.

Passage from the Pacific to the Atlantic.—The advantage which a ship will derive from passing through the strait, from the Pacific to the Atlantic, for there must be some great one to induce the seaman to entangle his ship with the land when fair winds and an open sea are before him, is very great. After passing through the strait, the prevailing winds being westerly, and more frequently from the northward than from the southward of West, they are fair for his running up the coast; or, if not, the ship is not liable to receive much injury from the sea, which is comparatively smooth; whereas, to a ship passing round the Horn, if the wind be N.W., she must go to the eastward of the Falkland Islands, and be exposed to strong gales and a heavy beam sea, and hug the wind to make her nothing. To a small vessel the advantage is incalculable; for, besides filling her hold with wood and water, she is enabled to escape the severe weather that so constantly reigns in the higher latitudes of the South Atlantic Ocean.

Coming from the northward it will be advisable to keep an offing until the western entrance of the strait is well under the lee, to avoid being thrown upon the coast to the northward of Cape Victory, which is rugged and inhospitable,

and forming, as it were, a breakwater to the deep rolling swell of the ocean, is for some miles off fringed by a cross hollow sea almost amounting to a rippling.

The land off Cape Victory is high and rugged, and much broken ; and, if the weather be not very thick, will be seen long before the Evangelists, which are not visible above the horizon from a ship's deck for more than 4 or 5 leagues.* Pass to the southward of them, and steer for Cape Pillar, which makes like a high island. In calm weather do not pass too near to the cape, for the current sometimes sets out, and round the cape to the southward ; but with a strong wind get under the lee of it as soon as you please, and steer along the shore. In the night it will be advisable to keep close to the land of the South shore ; and if a patent log be used, which no ship should be without, your distance will be correctly known. The course along shore, by compass, is E. $\frac{3}{4}$ S. ; and if the weather be thick, by keeping sight of the South shore, there will be no difficulty in proceeding with safety.

The *Adventure* entered the strait on the 1st of April, 1830, at sunset ; and after passing within half a mile of the islets off the Harbour of Mercy, steered E. $\frac{3}{4}$ S., *magnetic*, under close-reefed topsails, braced by, the weather being so squally and thick that the land was frequently concealed from us ; but, it being occasionally seen, the water being quite smooth, and the course steadily steered, with the patent log to mark the distance run, we proceeded without the least anxiety, although the night was dark, and the squalls of wind and rain frequent and violent. When abreast of Cape Tamar, that projection was clearly distinguished, as was also the land of Cape Providence, which served to check the distance shown by the patent log ; but both giving the same results, proved that we had not been subjected to any current ; whereas the account by the ship's log was very much in error, in consequence of the violence of the squalls and the long intervals of light winds, which rendered it impossible to keep a correct account of the distance. At daybreak we were between Cape Monday and the Gulf of Xaultegua ; and at eight o'clock we were abreast of Playa Parda, in which, after a calm day, the ship was anchored.

In the summer season there is no occasion to anchor anywhere, unless the weather be very tempestuous ; for the nights are short, and hardly dark enough to require it, unless as a precautionary measure, or for the purpose of procuring wood and water ; the best place for which is Port Famine, where the beaches are strewn with abundance of logs of well-seasoned wood, which is very superior to the green wood that must otherwise be used.

Notwithstanding the *Adventure* experienced no current in the western part of the strait, there is generally a set to the eastward, which is more or less felt according to circumstances. The direction and strength of the currents are caused by the duration of the gales.

The chart will be a sufficient guide for vessels bound through from the westward as far as Laredo Bay ; after which a few directions will be necessary. The land here should be kept close on board, to avoid the reef off the S.W. end of Santa

* From the *Adventure's* deck, the eye being 13 feet above the water, they were seen on the horizon at the distance of 14 miles.

Magdalena. Being abreast of it, bear away, keeping the N.E. extremity of Elizabeth Island on the starboard bow, until you see Santa Martha in one with, or a little to the southward of, the South trend of the Second Narrow (Cape St. Vincent), which is a leading mark for the fair channel until you pass the spit of shoal soundings, which extends across to Santa Magdalena. There are also shoal soundings towards the S.W. end of Elizabeth Island; at half a mile off we had 5 fathoms, Cape St. Vincent being then the breadth of Santa Martha open to the northward of that island. Keeping the cape just in sight to the northward of Santa Martha, steer on and pass round the low N.E. extremity of Elizabeth Island, off which are several tide eddies. The tide here sets across the channel (see remarks upon the tide at page 27).

Now steer for the Second Narrow, keeping Cape Gregory, which will be just discernible, as the low projecting extreme of the North side of the Second Narrow, on the starboard bow, until you are 3 miles past Santa Martha; the course may then be directed for the cape, opening it gradually on the larboard bow as you approach it, to avoid the shoal that extends off it.

If you anchor in Gregory Bay, which is advisable, in order to have the whole of the tide for running through the First Narrow, haul up and keep at $1\frac{1}{2}$ miles from the shore. When the North extremity of the sandy land of the cape is in a line with the West extreme of the high table-land, you will be near the anchorage; then shorten sail, and when the green slope begins to open, you will have 14 fathoms: you may then anchor, or keep away to the N.E., and choose a convenient depth, taking care not to approach the shore, so as to bring Cape Gregory to the southward of S. by W. $\frac{1}{4}$ W. (by compass). The best berth is with the cape bearing S.S.W. (see page 7).

Hence to the First Narrow the course by compass is due N.E. by E.* The land at the entrance being low will not at first be perceived, but on steering on you will first see some hummocky land, making like islands. These are hills on the eastern or Fuegian side of the Narrow. Soon afterwards a flat, low sand-hill will be seen to the northward, and this is at the S.W. extremity of Point Barranca (see p. 7). On approaching the Narrow at 4 miles off, keep a clifly head, 4 or 5 miles within the East side of the Narrow, open of the trend of Point Barranca, by which you will avoid the shoal that extends off the latter point (page 7). You should not go into less depth than 6 fathoms. At most times of the tide there are long lines and patches of strong ripples through which you must pass. The shoal is easily distinguished by the kelp.

When the channel through the Narrow bears by compass N. by E. $\frac{3}{4}$ E., steer through it; and that, or a N.N.E. course, will carry you through. On each side the bank extends off for some distance; but, by keeping in mid-channel, there is no danger until the clifly coast be passed, when reefs extend off either shore for some distance, particularly off Cape Orange. The N.N.E. course must be kept until the peak of Cape Orange bears S. and the northern Direction Hill (page 6) W.S.W., or W. by S. $\frac{1}{4}$ S. by compass. Then steer E.N.E. for Cape Possession,

* If from the Second Narrow, N.E. $\frac{1}{4}$ E. will be the compass course; but I should recommend a ship hauling up to the northward until abreast of Cape Gregory, and then to steer as above.

taking care not to approach too near to the bank off Cape Orange, or the one on the North side of Possession Bay, for which the chart must be consulted.

For a small vessel, the passage through the strait from West to East is not only easy, but to be strongly recommended as the best and safest route. Indeed, I think the passage would be quite as expeditious, and perhaps much safer, to enter the Gulf of Trinidad, and pass down the Concepcion Strait, the Sarmiento or St. Estevan Channels, and Smyth's Channel, and enter the strait at Cape Tamar. In these channels northerly winds prevail, and there is no want of convenient and well-sheltered anchorages for the night, many of which have already been mentioned, and multitudes of others, and perhaps much better ones, might be found.

The following remarks are by Mr. J. H. Smith, who passed through the strait from the eastward in January, 1836, and from the westward in July in the same year.

The winter months no doubt are the best to make a passage through from the eastward. Capt. King remarks, you have much finer weather and frequent easterly winds, both of which I experienced.

From the westward, in the summer months, I should not hesitate, in any vessel, to come through; the nights being short, and constant westerly winds, you may choose your anchorages. My passage through, last July, answered a double purpose, although longer than I had reason to expect. We procured wood and water, repaired sails, rigging, &c., and in a measure recruited the crew, they being in their beds every night; for I am well aware that, had we come round Cape Horn, not one of them would have weathered it out. The scurvy had already made its appearance, and all complaining of sore feet, caused by constant wet with salt water. I always made it a point, ere I started in the morning, to secure an anchorage before dark, owing to the crew being in a sickly state.

In a square-rigged vessel I would not attempt the passage from East to West, not from any fear of wreck, but the detention likely to accrue; and, for this reason, putting back occasionally from the place you start from would be no uncommon circumstance. In two or three instances, when I was obliged to do so (say to Tamar Harbour or Borja Bay), had not the *Mary Anne* been a handy and good sailing vessel (a schooner), we should not have been able to gain the anchorages, and in that case lost as much ground as would have taken days to fetch up.

It may be well enough for her Majesty's ships, with plenty of hands, when detention, at times, is no great object, but not for merchant vessels, who have no more than just sufficient to weigh an anchor, and almost everything depends upon the facility with which they perform their voyages.*

PASSAGES ON THE WEST COAST OF AMERICA.

CHILE.

Capt. FitzRoy says:—How to make passages is easy to tell, for there are but two ways. When going to the northward, steer direct to the place, or as nearly so as is consistent with making use of the steady winds which prevail in the offing; and if bound to the southward, steer also direct to the place, if fortunate

* Nautical Magazine, April, 1837, pp. 220-1.

enough to have a wind which admits of it : but if not, stand out to sea by the wind, keeping every sail clean full, the object being to get through the adverse southerly winds as soon as possible, and to reach a latitude from which the ship will be sure of reaching her port on a direct course. Every experienced seaman knows that, in the regions of periodic winds, no method is more inconsistent with quick passages than that of "hugging the wind." When Rear-Admiral Sir Thomas Hardy was on the coast, he used to cross the southerly winds with a topmast studding-sail set, his object being to get through them.

PERU.*

With regard to making passages along this coast, little difficulty is found in going to the northward ; a fair offing is all that is requisite to ensure any vessel making a certain port in a given number of days : but in working to windward some degree of skill and constant attention are necessary.

Much difference of opinion exists as to whether the in-shore or off-shore route should be preferred ; but Capt. FitzRoy's experience, added to the information he obtained from those who were said to understand the navigation of that coast, led him to suppose the following mode to be the best :—

On leaving Guayaquil or Payta, if bound to Callao, work close in-shore to about the Islands of Lobos de Afuera. All agree in this. Endeavour always to be in with the land soon after the sun has set, that advantage may be taken of the land-wind, which begins about that time ; this will frequently enable a ship to make her way nearly along shore throughout the night, and place her in a good situation for the first of the sea-breeze.

After having passed the before-mentioned islands, it would be advisable to work upon their meridian, until you approach the latitude of Callao ; then stand in, and if it be not fetched, work up along shore, as above directed.

Some people attempt to make this passage by standing off for several days, hoping to fetch in on the other tack ; but this will generally be found a fruitless effort, owing to the northerly set that takes place on approaching the equator.

For a vessel bound from Callao to Valparaiso, there is no question but that by running off with a full sail the passage will be made in much less time than by working in-shore, for she may run quite through the trade, and fall in with the westerly winds, which are always found beyond it. But for the intermediate ports (excepting Coquimbo) the case is different, as they lie considerably within the trade-wind, and must be worked for by that alone.† For these ports it may be recommended to work along shore as above directed, as far as the Island of San Gallan, from whence the coast trends more to the eastward, so that a long leg and a short one may be made (with the land just in sight) to Arica, or to any of the ports between it and Pisco.

From Arica, the coast being nearly North and South, vessels bound to the southward should make an offing of not more than 15 or 20 leagues (to ensure

* Remarks by Capt. FitzRoy.

† A very dull sailer indeed, in this case, might do better by running through the trade, and making southing in the offing, so as to return to the northward along the coast, than by attempting to work to windward against a trade-wind, which never varies more than a few points.

keeping the sea-breeze), and work upon that meridian till in the parallel of the place to which they are bound. But on no account is it advisable to make a long stretch off; for as the limit of the trade-wind is approached, it gradually hauls to the eastward, and great difficulty will be found in even fetching the port from which they started.

The average passage, in a well-conditioned merchant vessel, from Guayaquil to Callao, is from fifteen to twenty days, and from Callao to Valparaiso about three weeks; fast-sailing schooners have made these passages in much less time; and there is an instance of two men-of-war, in company, having gone from Callao to Valparaiso, remained there two days, and re-anchored at Callao on the twenty-first day. But these are rare occurrences, and only to be done under most favourable circumstances, such as meeting with a "norther" soon after leaving Callao.

Remarks by M. Lartigue.—The navigation of the Peruvian coast is very easy in summer; the breezes are moderate; the weather, which is generally clear, allows the latitude to be observed nearly every day, and to recognise, by this means, the part of the coast opposite to which you may be: there is then no inconvenience in keeping a moderate distance off, so as to meet with fresh breezes, and thus shorten the passage.

The weather, which is often cloudy in winter, will not allow of observations to be taken every day, and you must then direct your course by your dead reckoning, or from the more remarkable objects lying on the coast. Those which are met with between the Quebrada Camarones and the valley of Tambo may be made out at a considerable distance, so that when between these two remarkable points you may proceed by keeping 7 or 8 leagues off the land. At this distance the sea-breezes keep up through the greater part of the night.

The only objects at all remarkable that are to be met with between the valley of Tambo and that of Quilca are the points of Ilay and Cornejo, but these cannot be made out at more than 3 or 4 leagues off, for when farther off they appear confounded with the high land of Peru. It seems that, in this season, you must continue to fix your position by the sight of the land, and so follow the coast at less than 3 or 4 leagues distant; but as you then only find light airs, interrupted by calms which may last for several days together, you run the risk of being carried too near the land by the heavy swell which is felt on all its extent. The depth on it is considerable, and the quality of the bottom very bad; it is only at the opening of the valleys that you can hope to find, at 2 or 3 miles from the shore, less than 25 fathoms water, over a bottom of mud or fine sand. The only advantage that will be gained by sailing so near the land will be to profit by the lightest breeze to get to an anchorage, and to be seldom exposed to the chance of overrunning it; but these advantages, as will be seen, are not of a nature to compensate for the inconveniences, or rather the dangers, to which it exposes a ship.

It would, therefore, be better to sail farther off the land, keeping at 7 or 8 leagues' distance; as when between the Quebrada Camarones and the valley of Tambo the swell is not felt at this distance, and the winds will be fresh; but the currents, which constantly run to the N.W., cause the reckoning to be very erroneous, and you may be carried to leeward of your port, or the anchorage you may be seek-

ing. Beyond this, this inconvenience is without danger, and cannot occasion more than a hindrance; for in returning to the required destination, sailing to the southward, you must run to the offing, bear up to the wind, and then, approaching the land, reach the port which has been overrun. It is, notwithstanding, necessary, following the general rule, to make an exception which in some circumstances may shorten the passage. We have said that the breeze was sometimes tolerably fresh, and that then the counter current, which runs to the South along the land, extends some miles in the offing; it is evident that it would be better to work in this counter current, at all times when the force of the wind allows it, and you have not overrun your port more than 2 or 3 leagues: but if you should have done so to a greater distance, it will be preferable to take directly the first course, and profit by this breeze to get away from the land.

It will be advantageous to manœuvre thus every time you are on any portion of the coast which is described.

What has just been said relative to the mode of navigating and running along the coast of which we have been speaking applies to the portion comprised between the valleys of Quilca and Ocoña. But it is necessary to observe, that the valley of Camana, which is also as easy to be made out at 7 or 8 leagues' distance as that of Quilca, has the inconvenience, as well as the latter valley, of not being perfectly recognisable when it bears to the N.E., when it is passed, and you cannot sometimes reach the anchorage on that tack.

In winter, as in summer, you must always be particular to approach the land to the South of the intended port, and then range the land at a short distance. The breezes being more fresh in summer, and the swell less heavy, make the ports present fewer difficulties than in winter.

Capt. Basil Hall's Passages on the Coast of Peru.

*From Valparaiso to Lima, 27th January to 5th February, 1821 (9 days).—*The wind on this passage is always nearly the same, viz., S.S.E. It sometimes hauls a point or two to the eastward, but the passage is always certain. The only precaution to be attended to is to run well off the land in the first instance, say 150 miles, on a N.W. course, and then steer direct for San Lorenzo, a high and well-defined island, forming the eastern side of Callao Bay. It is usual to make the land of Morro Solar, which lies 10 miles to the southward of Callao, and then run into the roads by the Boqueron passage, or proceed round the North end of San Lorenzo. By attending closely to the directions on Mr. Foster's chart, transmitted to the Admiralty, any vessel may safely enter the Boqueron; but great attention must be paid to the lead and the bearings, and an anchor kept ready to let go.

It is generally calm in the mornings, and sometimes foggy; but about eleven o'clock it clears up, and the breeze freshens from the southward, which enables ships to reach the anchorage generally without a tack, after rounding the North end of Lorenzo; so that, upon the whole, this outer route, which is entirely free from danger, is preferable to the other, at least for a stranger.

*Lima to Valparaiso, 28th February to 18th March, 1821 (18 days).—*The return passage from Peru to Chili requires some attention, and may generally be made

PASSAGES.

by a man-of-war in less than three weeks; it has been made in less than a night by a frigate, which, however, on the next occasion, took twenty-eight days. The point which contributes most to the success of this passage is keeping west of the wind after leaving Lima, and not having any scruples about making westing, provided southing can also be gained. The S.E. trade-wind, through which the greater part of this course is to be made, invariably draws to the eastward at its southern limit, and, therefore, a ship eventually can always make her southing. The object, however, being to get past the trade and into the westerly winds, which lie to the southward, a ship ought to keep the wind, at least abeam, while crossing the trade. In winter, that is, when the sun is to the northward of the equator, the trade-wind blows steadier, and its southern extreme lies 4° or 5° to the northward of its summer limit, which may be taken at about 30° or 31° S. The sun was near the equator when this passage was made, and we retained the trade-wind as far as 31° S., after which we had northerly and N.W. winds as far as the Island of Mas-a-fuera, when it shifted to South, and then to S.E. by S., blowing fresh. This changed to S.S.E., the regular coast-wind, as we drew in shore. During summer the land ought always to be made to the southward of the port. In winter, when hard North winds are frequent, this is not advisable. Perhaps, at such seasons, a direct course for Valparaiso may be the best, after losing the trade wind.

Valparaiso to Lima, by the "*Entremedios*," or *Intermediate Ports*, 27th May to 24th June, 1821.—From Valparaiso we steered at the distance of about 60 miles from the coast, as far as lat. $22\frac{1}{2}^{\circ}$ S.; when we hauled in, and afterwards coasted along in sight of the shore, at the distance of 7 or 8 leagues, as far as Arica. The winds being light from S.S.E., it was not till the 7th of June that we anchored there. From thence we coasted generally from the eastward, and Sama, and Ilo, to Mollendo, the winds being from the eastward, and drawing off-shore at night; calm in the mornings; and hauling in from the sea in the day, the weather invariably fine. From Mollendo to Lima we had a fresh breeze off-shore about S.E. On approaching the Morro Solar the wind fell light, and we were obliged to tow the ship through the Boqueron passage into Callao Roads. There is no difficulty in making a passage along the South coast of Peru from the eastward; but from the westward a great deal of vigilance is requisite to take advantage of every occasional shift of wind, since by this means alone can a passage be made. The best authorities are, I think, against standing out to sea to the south-westward, in the hopes of fetching in upon the starboard tack. The *Constellation*, American frigate, tried this passage, but she lost a great deal of time thereby, being at least three weeks in going from Lima to Mollendo. The *San Martin*, bearing Lord Cochrane's flag, made the passage to Arica which is considerably farther, in thirteen days, by keeping inshore, and taking advantage of the changes which take place, with more or less regularity, evening and morning.

As the weather along the South coast of Peru is invariably fine, ship otherwise incommoded at the various anchorages, than by a high sea, always rolls in at the full and change of the moon. Arica is never having any pretensions to the name of a harbour; but the severe

in Mr. Foster's Memoir may be considered safe, provided the ground-tackling be good.

Chorillos (near Lima) to Valparaíso, 10th to 28th of August, 1821 (18 days).—This being what is called the winter passage, we lost the trade-wind in lat. 25° S., after which we had the winds to the S.W. as far as lat. 27° S., lon. 88° W., when it shifted to the N.W. and West, and so to the S.W. and South, as far as lat. 33° S., lon. 78° W. We were much embarrassed by calms, light winds, and heavy rains, after which the wind came to the northward and N.N.W., with thick, rainy weather. We made the land to the southward of Valparaíso on the 27th, and got in next day by the wind coming round to the S.W.

At this season of the year, when northerly winds prevail, with heavy rain and unpleasant weather, it does not seem advisable to make the coast to the southward of the port. Neither ought a ship, I think, to run into Valparaíso in one of these gales, since the wind frequently blows home, and is attended by a high swell. During the winter the best ground-tackle ought to be laid out to the northward, and a berth taken sufficiently far from the shore to allow of veering, in the event of bad weather coming on. It does not seem necessary to take more than barely room for this purpose, since, by lying near the shore, there will be always an undertow, which relieves the sea-cable of great part of the strain. As the launch will on these occasions be apt to swamp at her moorings, she ought to be hoisted in before the gale comes on, of which the barometer, the threatening aspect of the weather, and the rising swell, generally give sufficient warning. Previous to a "norther," also, the land of Concon, and that beyond it to the northward, are seen with unusual sharpness and distinctness.

This passage in eighteen days may be termed short. Formerly thirty days was usual, it afterwards sunk to twenty-five days, and, at the period of our arrival, three weeks was considered good. Sir Thomas Hardy, in his Majesty's ship *Creole*, made the passage from Huacho in something less than fourteen days, the distance being more than 2,200 miles. This was early in May, 1821; and it is well worth attending to, that the trade-wind was crossed with a foretop-mast studding-sail set, no regard being paid to any object but getting through the trade-wind as fast as possible. The same ship, however, in February and March of the following year, was twenty-eight days making the passage, but this is unusually long for a man-of-war.

Valparaíso to Concepcion, Bay of Arauco, and Island of Mocha, 1st to 21st October, 1821.—As the prevalent winds along this coast are from the southward, it is necessary to take advantage of every slant that will allow of southing being made, and we were fortunate in meeting with a westerly wind on the third day after sailing, which carried us more than half the distance. The wind subsequently was South by West, which made the rest of the passage to Concepcion almost a dead beat. We arrived at Talcahuana, in Concepcion Bay, on the 8th. During the 9th it blew fresh from the northward. We afterwards beat up to the Bay of Arauco, and to the Island of Mocha, in $38^{\circ} 19'$ S., having on this occasion been favoured with a south-easterly breeze, and then a southerly one, to stand in with.

We endeavoured to reach Valdivia also, but the wind came from South by East,

and blew so hard that we were obliged, for want of time, to give it up. On the return passage to Valparaiso, we had light N.W. and West winds, then S.W., and so to the southward, and South by East, which is the most common wind.

These particulars would seem to point out that a passage may always be made to the southward; for the winds are seldom steady for twelve hours, and by taking care to profit by every change, southing must be made.

The passage from Valparaiso to Concepcion is generally made in ten days, which is also the usual time required for a passage to Lima; the distance, however, in the first case, is 220 miles, and in the latter, 1,320 miles—a circumstance which points out very decidedly the direction of the prevalent winds.

Valparaiso to Lima, calling at Coquimbo, Guasco, Copiapó, Arica, and Mollendo, 15th November to 9th December, 1821 (24 days).—The winds during these passages along shore are always light, and from the southward, hauling in from sea during the day, and freshening from off the land in the night.

Between Mollendo and Callao there is a pretty steady breeze from E.S.E., with a drain of current along shore—a remark which applies to the whole coast from Valparaiso to Lima.

A remarkable increase of the great S.W. swell is observable at the full and change of the moon on the coast, especially from Arica to Huacho inclusive—a circumstance which renders it difficult, and sometimes impossible, to land at those places.

Lima to Pacasmayas, Payta, and Guayaquil, 17th to 25th December, 1821.—The winds between Lima and Guayaquil are moderate from the southward; at night hauling to the south-eastward, and in the day from S.S.W.

This is the period at which the rains are expected to set in, and the heavy, threatening aspect of clouds over the hills gave us reason to expect that we should not escape, but none fell during our stay, between the 23rd and the 30th of December.

The passage from Guayaquil back to Lima requires attention, as may be seen from the following directions, which I obtained from Don Manuel Luzurragui, captain of the Port of Guayaquil.

“The average passage, in a well-found and well-managed ship, is twenty days; eighteen is not uncommon; and there is an instance of a schooner doing it in twelve. From the entrance of the river as far as Punta de Aguja (in lat. 6° S.), the shore must be hugged as close as possible, in order to take advantage of the changes of wind, which take place only near the shore. In this way, by due vigilance, slants may be made every day and night. On reaching Punta de Aguja, work to the southward, as nearly on the meridian of that point as may be, as far as $11\frac{1}{2}^{\circ}$ lat., and then strike in-shore for Callao, and if it is not fetched, creep along shore, as formerly directed.”

Persons accustomed to the navigation between Lima and Valparaiso are tempted to stand boldly out, in hopes of making their southing with ease, and then running in upon a parallel. But this is not found to be practicable; and indeed the cases have no resemblance, since the passage to Valparaiso is made by passing quite through the trade-wind and getting into the variables; whereas Lima lies in the heart of the trade; accordingly, a ship that stretches off from

Guayaquil comes gradually up as she stands out, and finally makes about a South course ; when she tacks again, the wind shifts as she draws in, and will be fortunate if she can retrace her first course, and very often does not fetch the point left in the first instance.

To work along shore with effect, the land must be kept well on board, and constant vigilance be bestowed upon the navigation, otherwise a ship will make little progress.

Capt. *Andrew Livingston*, well known in the nautical world, makes the following remarks on navigating to windward from Huanchaco to Callao :—The most intelligent, experienced persons with whom I conversed, generally recommended standing off-shore during the night, and in-shore during the day ; but advised that any person in charge of a vessel beating thus to windward should take care to be pretty close to the shore by sunset, to take advantage of the wind, which about that time generally draws rather off the land ; though not sufficiently to deserve the name of a land-wind.

On the above I remark, that on account of the land trending so much to the eastward, if you stand twelve hours off-shore and twelve hours in-shore, at the same rate of sailing, and have gained any southing of consequence, you will still be a considerable distance off-shore when your twelve hours are completed standing in ; and I think that it will be found in general most advisable to stand off only about ten hours, and in for fourteen hours ; as, even if you get in-shore rather too soon, you can, by making a short tack or two, be sure of being near the shore at sunset, when you may expect the wind rather to favour you for gaining southing with your larboard tacks on board.

On the tack off-shore you will generally find that the vessel comes up more and more as you stand off, but do not let this persuade you to stand off too far, even should the vessel head up South or S. by E. by compass, as you will lose more on the in-shore tack, when you must be headed off in proportion as you have headed up on the off-shore tack. The inspection of the chart will at once convince any person of this fact, even if there is no northerly current, and if there is (as is frequently the case) a northerly current, of course bringing that directly on or abaft a vessel's beam, must sag her to leeward.

On the coast of Peru the water is frequently of a dirty brown colour, and sometimes quite red, as if mingled with blood. Some say this is caused by fish spawn, others that it is occasioned by small crabs. I cannot say what it is, for I had no microscope, and the water, when drawn even from the reddest spots, showed no colour in a glass, although it looked rather muddy ; nor could I perceive animalculæ in it with the small magnifying glass attached to my sextant.

CENTRAL AMERICA, MEXICO, ETC.

Our information as to the best means of making a passage along these coasts is as yet but scanty. The following observations, therefore, by Lieutenant-Commander James Wood, of H.M.S. *Pandora*, become exceedingly valuable. In a former page we have given the observations on the prevalent winds in this region from the same officer.

From the Southward to Panamá Bay.—From what has been said respecting the winds which prevail within the first division, it will be seen that the passage from the southward to Panamá Bay is easily made during the greater part of the year; but in the fine season, when within the influence of the northers, the following plan should be adopted. Make short tacks in-shore, as there is generally a set to the northward found within a few miles of the land, and where that is interrupted, a regular tide is exchanged for a constantly contrary current farther off. Between Chirambira Point and Cape Corrientes the land is low and faced with shoals, caused by the mouths of the numerous rivers which have their outlets on this part of the coast, but after passing Cape Corrientes, it may be approached pretty closely, except off Francisco Solano Point, where some shoal rocky patches extend to seaward, as the coast is in general bold-to. Care, however, should be taken not to run into the calms caused by the high lands, as it is difficult to get off into the breeze again, and the swell sets in-shore where it frequently happens that no anchorage is to be found till close to the rocks.

In beating up the Bay of Panamá in the fine season, the eastern passage, or that between the Islas del Rey and the main, is to be preferred, as, with one exception, it is free from dangers. The water is smooth, and a regular tide enables you to make more northing than it would be possible to do, in nine cases out of ten, against the strong current and short high sea which at this season prevail in the centre or on the western side. During the rainy season, a straight course up the bay is preferable to entangling yourself with the islands, the current generally following the direction of the wind.

From Panamá Bay to the Southward.—But the great difficulty at all times consists in getting either to the southward or westward of Panamá. The passage to the southward is made in two ways,—either by beating up the coast against a constantly foul wind and contrary current, or by standing off to sea till sufficient southing is made to allow you to fetch your port on the starboard tack. Both plans are very tedious, as it frequently takes twenty days to beat up to Guayaquil, whilst six or seven days are an average passage down.

From Panamá Bay to the Westward.—If bound to the westward during the northers, a great deal of time may be saved by keeping close in-shore, and thus taking advantage of them; they will carry you as far as the Gulf of Nicoya. When past the Morro Hermoso, “Papagayos” may be looked for, and with them a course should be steered for the Gulf of Tehuantepec, when it will depend on the port you are bound to, whether, after crossing the gulf by the aid of one of its gales, you should keep in or off-shore. If bound for Acapulco, keep in and beat up; but if bound to the westward, you cannot do better than make a West course, as nearly as the winds will allow you.

The passage to the westward from Panamá during the rainy season is a most tedious affair, calms, squalls, contrary winds and currents, accompanied by a heavy swell and extreme heat, as well as an atmosphere loaded with moisture and rain, are the daily accompaniments. It often occurs that 20 miles of westing are not made in a week, and it is only by the industrious use of every squall and slant of wind that the passage can be made at all. Opinions are divided amongst the coasters as to the propriety of working to the southward and

trying to get rid of the bad weather, or beating up within a moderate distance of the land. My experience would lead me to prefer the latter, as the strong winds and frequent squalls which so often occur near the land sometimes allow a good long leg to be made to the north-westward, while, farther off, this advantage is sacrificed for only a shade finer weather.

From the Galapagos Islands to Cape St. Lucas.—I have already alluded to the difficulty of getting to the westward from the Bay of Panamá. The trade-wind seems to possess no steady influence to the eastward of a line drawn from Cape St. Lucas, in 22° N., to the Galapagos Islands on the equator. Amongst these islands the south-eastern trade-wind is steady during nine or ten months of the year, and it is only in January and February, and sometimes March, that they are interrupted by long calms, and occasional breezes North and N.W., but these are never of any great strength. To the northward of them, the eastern limit of the trade seems to depend upon the time of year. In the early part of April I have found it between the parallels of 8° and 13° N., 900 to 1,000 miles farther to the eastward than at the end of June; and in the intermediate months, either more or less to the eastward as it was earlier or later in the season, but in no case that I have met with has a steady or regular trade been experienced till the above line has been reached. It is this circumstance, and the prevalence in the intermediate space of westerly winds, calms, and contrary currents, that makes the passage from Panamá to the westward, as far as this line, so tedious. I have been forty days beating from the entrance of the bay in 80° W., to the eastern edge of the trade in 111° W., a distance of less than 2,000 miles, or on an average about 40 miles per day.

From the Meridian of Cape St. Lucas Westward.—When once within the influence of the trade, a passage is easily made either to the southward, westward, or northward; but it must be borne in mind that the eastern verge of this trade seems, in these parts, to be influenced by the seasons. Thus, in June and July, I found it fresh from N.N.W., and even at times N.W., as far out as the meridian of 125° W., whereas in March and April it was light from N.N.E. to E. and E.S.E., from our first meeting it in 98° W. till past the meridian of Cape St. Lucas in 110° W., where I picked up a good steady breeze from N.N.E.

As a general rule the wind is found to haul more to the eastward as you get farther off the land, and I did not find this rule affected by the latitude, as, although, as I have stated, the wind hangs to the northward, and even at times to the westward of North, near the eastern limit of the trade, from the tropic of Cancer to the variables near the equator, I found it about the meridian of the Sandwich Islands as far to the eastward on and near the line as it was in 35° N., in which latitude the westerly winds are in general met with.

Cape Horn to Mexico.—Lieutenant *Osborn*, R.N., says:—Supposing a vessel bound to the western coast of Mexico, and running before the southerly gale, which almost constantly blows along the shores of South America, she ought to shape a course so as to cross the equator in about 98° or 99° West longitude so that, when she gets the N.E. trade, she will be at least 6° or 7° to the eastward of her port—San Blas or Mazatlan, and have, at the same time, a sufficient offing from the Galapagos Islands to avoid their currents and variable winds.

We crossed in lon. 105° W., having been recommended to do so by some old merchants at Valparaiso, and were consequently, although a remarkably fast-sailing ship, a lamentably long time in making the distance. Several days' log of the ship shows as follows :—March 24th, San Blas, 672 miles distant ; 25th, 646 miles distant ; 26th, 657 miles distant. Our track led us to be exactly in the same longitude as our port ; when we got the trade, and it hanging well to the northward, we were constantly increasing our distance until in the latitude of San Blas, when an in-shore tack of course shortened it. But by the course I have recommended, the first of the N.E. trades will drive the vessel into the meridian of her port, and she will thus daily decrease her distance.—(Nautical Magazine, March, 1849, pp. 139-40.)

CALIFORNIA.

Should a vessel be bound to California direct, I would cross the equator in the Pacific Ocean in about lon. 100° W. ; cross the N.E. trade with a topmast studding-sail set, and thus pass into the limit of the westerly winds, about 300 miles to windward of the Sandwich Islands ; and once on them, take good care to keep to the northward of my port, for, as you approach the shore, the wind will draw round North, and the current to the southward increase.—(Lieutenant Osborn, R.N.)

Vancouver was on this coast in December, 1793, and makes the following remarks on the navigation on the Californian coasts, about Monterey and San Francisco :—

The constant North winds occasion great difficulty in getting to the northward. The practice of the Spaniards was to stand a great distance into the ocean, until they reached far to the northward of the parallel of the port whither they were bound, and then steer for the land ; but from our observations, during the time we were navigating these shores, such a precaution did not appear by any means necessary, at least at that season of the year ; and as this coast had now been explored, and the direction of its shores and conspicuous places ascertained, so far as our survey extended, I was convinced that vessels, with the winds we had from the Bay of San Francisco (lat. 38°) to Point Concepcion, or indeed farther to the northward, would make as good a passage with the assistance of the land-winds, which in general blow from the East and S.E. to the north-westward, as they could make with the sea-breeze to the south-eastward, since the land-wind prevails during a larger proportion of the twenty-four hours than the sea-breeze, and frequently blows stronger ; besides which, most sailing vessels would gain some advantage, in the daytime, by turning to windward with the sea-breeze, which generally blows steadily and moderately over a sea that is smooth and tranquil.—(Vancouver, vol. ii. pp. 490-1.)

AUSTRALIA AND NEW ZEALAND TO CAPE HORN.

The passage from Australia and New Zealand around Cape Horn to the Atlantic is governed by very different circumstances to that in the reverse direction. In the latter, the trade-winds and their corresponding currents would

facilitate the passage, and offer insurmountable obstacles to that from West to East. The track, then, in a high latitude, becomes the best, as it is the shortest, and the prevalent winds and currents in it are favourable.*

In selecting the best parallel on which to make easting, the chief consideration is the chances of meeting with floating ice; and were it not for this, there is no doubt but that a very high latitude, say 60° to 65° , notwithstanding the rigour of the climate, would be the best and least boisterous parallel on which to make the voyage. But, of course, this is impracticable except under extreme difficulty and caution, and only to be thought of by those ships who have other objects, as whale or seal fishing, to induce them to seek such inclement zones.

Unfortunately we have not sufficient data to state absolutely on what parallel the sea becomes free from icebergs in different seasons, and we have nothing but analogy to guide us in this. At the same time, it must be supposed that any amount of accumulated observation would not definitively settle the point; it would still remain a subject of chance, that floating ice may be encountered at any time in the lowest parallel to which it has been known to reach.

Passing from this, the primary point in the question, it has been demonstrated, in the early part of this chapter, that the actually shortest track between these distant points leads to a very high latitude, unattainable to shipping; therefore the most advantageous route to be followed must be a combination of these two circumstances.

Thus the shortest route, on a great circle, from Hobarton to Cape Horn, or rather the Diego Ramirez Islands, reaches the lat. of $75^{\circ} 30' S.$, in lon. $135^{\circ} 50' W.$ The course on leaving Storm Bay is S. by E. $\frac{1}{2}$ E. So that it would be in reality a better course, as to nearing the destination, if a ship were to steer due South from Van Diemen's Land until a proper parallel be attained, rather than bear to the E. by S. on a rhumb course. Any course between these two, therefore, will be advantageous.

From Sydney to Diego Ramirez, the great circle course carries a ship 300 miles to the S.W. of New Zealand, and attains lat. 73° , in lon. $130^{\circ} 45' W.$

From New Zealand to Diego Ramirez the approximate great circle course becomes more practicable in the summer fall of the year. The track from Wellington, Cook's Strait, leads into the highest latitude, $66^{\circ} 30'$, longitude $117^{\circ} 15' W.$ The course on first leaving Cook's Strait will be S.E. by S., and on nearing Diego Ramirez, N.E. $\frac{1}{4}$ E.

It will be thus evident that, as a general principle, it is quite out of the question that such high latitudes can be attained, and the shortest route pursued. Recourse must therefore be had to what has been denominated composite great circle sailing, and which will be readily understood to signify that the maximum latitude is to be attained by the shortest route in the direction of the port, and then the

* Respecting the choice of the route to be pursued from Australia or Van Diemen's Land there is some difference of opinion. It is thought by some that the chances for the quickest and best passage is to the *westward*, by vessels leaving the colonies from the beginning of November to the first week in February. Others, again, contend for the Cape Horn route, as we here describe. But the more ample discussion of this point will be reserved for a future work, specially referring to the countries in question. The present consideration is limited, therefore, to the Pacific route.

ship to be conducted along the parallel selected, until she again cuts the great circle course leading to her destination.

Supposing the parallel of 55° to be that chosen, then the great circle track from Sydney cuts in longitude 165° or 166° E., to the southward of the Auckland group, and this followed up brings the ship to the South extremity of America.

Capt. Boulton, in the *Arethusa*, passed to the southward of this parallel from Hobarton around Cape Horn, which passage will be interesting in connexion with our present subject. The *Arethusa* left Hobarton December 13, 1832, and passed to the northward around Staten Island January 27 following, thus occupying forty-five days in crossing the Pacific. The track followed scarcely appears one to be recommended. They made Antipode Island December 25, and met with the first ice January 4, 1833, in lat. $54^{\circ} 48' S.$, and lon. $148^{\circ} 57' W.$; at the same time they saw seals, sea-elephants, and innumerable flocks of the snow petrel, and the sea much discoloured with rock-weed, which led to the supposition that some small island exists in the vicinity. On the 8th, 9th, and 10th of January, on the parallel of about 56° , between lon. 131° and $124^{\circ} W.$, they met with an immense collection of ice in one level chain for 20 miles East and West, with hundreds of similar ones of all sizes, one of which was 840 feet high. Passing this, in about the same latitude, an almost impassable barrier was fell in with January 20, in lat. $56^{\circ} 59'$, lon. $93^{\circ} 46' W.$ Preserving the parallel of about 57° , they continued through ice visible in all directions, till the morning of the 24th, in lat. $56^{\circ} 51'$, lon. $78^{\circ} 6'$, where the last ice island was passed, and after having had little rest or comfort for twenty days. At noon of January 26, saw Diego Ramirez Island, and on the 27th made and passed Staten Island. The weather off the cape was the finest imaginable, as had been the case in two previous voyages, one in the depth of winter.

There is one important fact to be derived from this voyage, that far to the northward of a sea comparatively clear, there exist vast masses and barriers of ice of every description, which must have been drifted northward from the southern Polar Sea, to a parallel from which to the southward they never return.

The effect of the antarctic drift is that here alluded to, and which, as will be seen by previous remarks, is now clearly established. How far the breaking up of the winter collections of ice by the effect of the summer may be periodical, we have no means at present of determining; but it is most probable that the period best adapted for passing, as to daylight, through this high latitude, is that in which the greatest amount of ice-drifts are to be expected. It is also probable that, as the summer advances, the greater part of the floating masses of ice may have proceeded so far to the northward as to leave a comparatively free space between them and the perpetual icy barrier surrounding the South Pole. That such in some degree is the case we have the evidence of the well-known voyage of the *Tula*, under Capt. Biscoe, in January and February, 1832, the year previous to Capt. Boulton's passage, above recited.

The *Tula* remained sealing with indifferent success about the Chatham and Bounty Islands till January 4, 1832, when they bore away from the latter to the S.E. On January 25, in lat. $60^{\circ} 45' S.$, lon. $132^{\circ} 7'$, icebergs were met with. On the 31st, in lat. $64^{\circ} S.$, lon. $118^{\circ} 33' W.$, about a hundred were in sight

together; and on February 3, in lat. $65^{\circ} 32'$, lon. $114^{\circ} 9'$, the phenomenon of one falling to pieces was observed. On February 12, lat. $66^{\circ} 27'$, lon. $81^{\circ} 50'$, many birds were seen, and two hundred and fifty ice islands counted from the deck. On February 15, Adelaide Island (then discovered) was seen. It may be presumed that if Capt. Biscoe's object had been to round Cape Horn, he could have attained its meridian by about February 17, thus making this passage about forty-four days, or very nearly the same as that of the *Arethusa*, from Hobarton.

Capt. Biscoe concludes the abstract of his log of this passage with the following remarks:—In the very high latitudes, when actually, as it were, *within* the ice, the winds were almost uniformly from the South, round by S.E. to E.N.E.; which, being *contrary* winds to a vessel in proceeding from East to West, he was inclined to recommend that future attempts of the same nature should be made in the opposite direction, viz., from East to West. Outside the ice, however, the winds were constantly westerly; and it may, therefore, admit of doubt, whether the convenience of having a fair wind at command, whenever required (as in the *Tula's* case), to run for shelter and repairs, be not of more importance than when its possession can seldom be of vital consequence, and may frequently lead to rashness and imprudence.

These remarks will demonstrate that too high a latitude, unless it be for a short distance, and with favourable circumstances, is not to be recommended, except to vessels properly equipped or on special service.

There is no question but that a vessel may make a quicker passage from the eastern coast of Australia around Cape Horn, at any season, rather than going westward around the Cape of Good Hope, and more especially in summer; and there is no doubt but that considerable variation as to the quantity and latitude of the floating icebergs will occur in different months. In the two examples cited, the months of January and February are those in which ice has been found abundantly, but in a high parallel. Probably earlier, or later in the summer, they will not be so frequent or so low in latitude. Thus Lieutenant Ball, in H.M.S. *Supply*, left Port Jackson November 26, 1791, and passed around Cape Horn January 6, 1792, or forty-one days. He passed between latitudes 50° to 57° S., and found *no ice* in the track. Again, Capt. Hunter, in H.M.S. *Sirius*, left Sydney October 2, 1788, and stood to the S.E. as far as lat. 50° S., keeping between this and 56° S. until round Cape Horn, which was doubled November 26, or on the fifty-fifth day, longer than those named previously. In lat. 57° S., lon. 76° W., they passed many ice islands, derived from the Graham's Land, or other sources to the southward. These examples show that considerable difference in respect to the dangers of floating ice are found in comparatively short intervals.

Perhaps the summer months are not the most favourable, in this point of view, for sailing in high latitudes. The great and perhaps indispensable advantage, however, being the long days and comparative freedom from darkness, whereby the dangers are far more easily seen and avoided than in the winter, when the low altitude of the sun, and the shortness of the daylight, contract very much the chances of making a good passage.

Later in the season than we have named previously, good passages have been made. The *Caroline* left Hobarton February 9, 1834, and had not adverse

circumstances occurred, might have reached England in three months. She had fair winds and favourable weather for seven weeks, nor did she see any ice until round Cape Horn.

The *Surrey* quitted Sydney April 9, 1830, and passing to the northward of New Zealand (which we have shown to be a circuitous route), reached the Downs August 2. On May 29, in lat. $58^{\circ} 30'$ S., lon. $118^{\circ} 12'$ W., a small piece of ice was the only one seen in the passage. Another ship met with an immense iceberg in lat. 53° S., lon. 130° W., August 7, 1831, and an immense number of icebergs, as far as lon. 118° W.

It is thus evident that a ship to pass round Cape Horn must enter on a parallel of latitude where inclement, though perhaps not boisterous, weather is inevitable, and also she has the chances of meeting with it at any season, but more especially in the early part of the summer, January and February. Therefore, any ship which is not calculated to sustain some amount of buffeting from the floating ice should not attempt to combat with the passage in a high latitude. Yet much advantage is to be gained. Not only does the weather appear to be generally more moderate, but *outside* the ices the winds are generally favourable, and a speedy passage, conducted with a strict look-out, may be expected, and is not to be considered a very hazardous undertaking.

There is one observation, however, that may be made respecting the high southern track in the southern season (January to March), and that is, it is possible that north-easterly winds are not uncommon on the parallel of 60° . Capt. Forster found them to be the prevailing winds at South Shetland in the months of January and February. This, too, must necessarily affect the strength of the easterly currents, which, around Cape Horn, were found to have double the velocity in the autumnal months that they had in the summer. The remarks of Capt. Weddell, pages 1289—1291, will be found very important in connexion with this.

From New Zealand (Cook's Strait) the great circle tracks to Valparaiso or the ports of Chile appear to be especially advantageous, and they are particularly recommended to the attention of the mariner. They carry the ship far away to the southward from the rhumb track, and, it is probable, into a better system of winds than will be found on that parallel, as will be hereafter alluded to.

On quitting Port Nicholson for Valparaiso the direct course is about S. 51° E., *true*, and passes through lat. $45^{\circ} 50'$, on the meridian of the Chatham Islands, that is, about 100 miles to the southward of the group. Gradually turning more to the East it attains the maximum lat. 54° , in about lon. 134° W. Arrived off the American coast, on the parallel of Concepcion, the ship will be about 175 miles distant, and sailing N. 47° E. This course, it will be seen, is in the direct drift of the Peruvian current alluded to, and, at all events during the latter portion of the route, the winds may be expected to be directly favourable for the port. So that by taking the higher latitude, rather than sailing on the rhumb course, it is more than probable that the winds throughout may be steady, more or less, from the western quarters and the limits between the regular trade-winds and the system of N.W. winds which predominate to the southward of them, which limits, at least at certain seasons, are subject to variable, and at times very violent, gales.

If the parallel of 54° should be considered too high a latitude to be attained, though the distance to be gone over within some distance of it is not very great, and that of 50° be preferred, by using the composite great circle track, this parallel will be attained from Cook's Strait in about lon. 165° W., and, by sailing along this parallel as far as lon. 104° W., the great circle course is again intersected, and the easterly course will then be changed to N. 66° E. If lat. 52° should be preferred, the great circle course cuts it in lon. $156^{\circ} 30'$ W. and $112^{\circ} 30'$ W.

The rhumb course between Cook's Strait and Valparaiso is about E. $5^{\circ} 30'$ N.; and one great advantage in the great circle track is, that it offers such a wide range of ocean in which a shorter passage than on the rhumb can be made; for, should a ship sail anything to the East of S.E. by E., she will be nearing her port more than if she were to take the E. $\frac{1}{2}$ N. course. Or even should she steer considerably to the South of S.E. by E. on leaving Cook's Strait, supposing it were either practicable and advisable, she would not commence a more really circuitous route than that on the rhumb.

From *Sydney* to *Lima* the same track might be nearly followed, as it certainly appears to be the best course to pursue to pass between the islands of New Zealand, through Cook's Strait, and then by the shortest (or great circle) course to the parallel of 35° S., in lon. 85° W. This point will be somewhere about the southern verge of the trade-wind, and the port will then bear N. 17° E., which a ship may expect to lay up to in crossing the S.E. trade. The great circle course from Cook's Strait is first S. $57^{\circ} 20'$ E., and attains its maximum latitude, 51° , in longitude 141° W. Now this course, from Cook's Strait to lat. 35° S. and lon. 85° W., carries the ship to the southward of the space where the wind is variable, and certainly stormy at one period of the year, as was found by Capt. Newby, in the *Agenoria*, who made the voyage under consideration, but kept the parallels between 40° and 43° S. in July, August, and September, 1850. The weather was most stormy and wild throughout the passage across the Pacific, which was, at the same time, a very quick one. We will give the following brief particulars of it, as it is an interesting one in many points.

The *Agenoria* left Sydney, July 17, 1849, for Port Nicholson and Lima, reaching the former on the 24th. Quitted Port Nicholson on August 9th, and steered to the northward of the Chatham Islands; and between the 12th and 14th of August (or *four* days, in consequence of crossing the meridian of 180°) she had run 861 miles, which brought her into lat. $43^{\circ} 30'$, and lon. $163^{\circ} 32'$, by dead reckoning. The weather had been tolerable, winds steady and brisk, between North and N.W. On the 17th, strong gales and high seas came from the West and S.W., which, by the 18th, increased to a tremendous height. It had veered from S.W. to W.S.W., with most awful lightning and thunder, with St. Elmo's fire at each mast-head and extremities of the yard-arms. The force of the wind was so great as to strain the rigging visibly, but fortunately she escaped without loss of spars. Much way was, however, made, as by the 21st she had reached lat. $40^{\circ} 6'$, and lon. $135^{\circ} 51'$. On this day the weather became more moderate, and the wind came more from the West. On the 27th, in lat. $40^{\circ} 29'$, lon. $111^{\circ} 6'$, considerably to the East of her dead reckoning, the wind had again got to the

South of West, squally rough weather. During the passage the barometer had sunk with the southerly winds as low as $29^{\circ}.12$, between which and $30^{\circ}.8$ it had varied. The first-named height was during the terrific weather of the 19th. On the 25th hard squalls from W.S.W. carried away the main-sheet on the starboard side; lat. at noon $40^{\circ} 48' S.$, lon. $120^{\circ} 12'$. On the 26th the sea remarkably cross on the starboard beam and quarter; still squally. This weather kept on for several days. On the 31st the squalls were tremendous, and the sea terrific; the barometer low, at $29^{\circ}.32$, and still falling; the ship labouring frightfully, but she had made great way; lat. $40^{\circ} 14'$, lon. $94^{\circ} 25'$, very much to the East of her dead reckoning. On September 1st, barometer still falling, though it was $29^{\circ}.16$, gale at N.N.E., and shifted in a furious squall to N.W.; the sea in a most confused and turbulent state. A great difference between the dead reckoning and observation, which, after all corrections, shows the ship has been set S. $49^{\circ} E.$ 38 miles in the last twenty-four hours. There has probably been a hurricane to the S.E., which has caused a most dreadful commotion among the elements at the ship's position, lat. $40^{\circ} 57'$, lon. $91^{\circ} 17'$. Kept her head to N.E., and, on the following day, to N.N.E., weather better. On the 7th made the Island of St. Felix, steering North; saw several whales, both sperm and black. Reached the trade-winds on the 10th, in lat. $19^{\circ} 55' S.$, lon. $79^{\circ} 24' W.$, though it was no better than East. Made the land on the 12th, the Hormigas, after running down 220 miles of latitude in the last twenty-four hours, and arrived off Callao on the 13th, anchoring there on the following day, the thirty-seventh from Port Nicholson, on three of which but very little progress was made.

On reference to the journal it would almost seem probable that Capt. Newby had encountered the southern verges of one or more revolving storms, which hastened him on the middle portion of the voyage. At all events it was a most boisterous one, and sadly damaged his rigging. It ought to be well considered, therefore, whether a higher latitude might not be more free from such violent weather.

PASSAGES BETWEEN THE PACIFIC ISLANDS.

Valparaiso to the Marquesas.—Valparaiso lies to the southward of the parallel where, in the offing, the easterly winds may be expected to be found; therefore a course to the N.W. is to be recommended in the first part of the passage. To aid this portion of the voyage, the northerly Peruvian current will be found serviceable, and further to the West is that counter current (if it be a permanent drift?) found by the Prussian ship *Mentor*, and hence called the *Mentor's Counter Current* (see page 1239). The existence of this current is also, in some degree, confirmed by Capt. Bruce, who, in August, 1837, found a strong N.E. current near to St. Ambrose Island. The following are the notes on the passage between Valparaiso and the Marquesas, which confirms the previous view:—Leaving Valparaiso, August 8th, we kept a brisk trade from S.S.W. to S.E., with very fine weather, and in seventy-two hours were abreast of St. Ambrose Island, after passing which, and proceeding westward direct for the Marquesas, with steady winds from S. to E. by S., very fine weather, in seven days we had run 1,286 miles, and made good 1,272 miles. Proceeding on a W. $\frac{1}{2}$ N. course, kept the

trade-wind till August 19th, when it fell light and calm till the 26th; from lat. $19\frac{1}{2}^{\circ}$ S. to $18^{\circ} 50'$, lon. 103° to 111° W. Wind sprung up from E. to N.E., and continued until September 3rd, when it again became calm, the currents generally westerly. On September 7th made Magdalena Island (the easternmost of the Marquesas), bearing W. 40 miles. Anchored in Resolution Bay, Santa Christina Island, Friday, September 8th, thirty-one days from Valparaiso.

Pitcairn Island to Valparaiso.—H.M.S. *Imogene* left Pitcairn Island December 9, 1837; stood to the southward with the wind at East, which continued at East and N.N.E. the six following days. On the 15th, a breeze at E.S.E., stood to southward beyond lat. $34^{\circ} 39'$ S., lon. $122^{\circ} 4'$ W. On the 16th, tacked to the N.E., the wind continuing at East and E.S.E. till 19th, when it came to N.N.E., enabling the ship to make a good course. During this time the currents were to East and S.E., 23 to 18 miles a day. On the 20th, wind drew to North, a fresh gale, with heavy sea, barometers falling considerably; lat. 16° S., lon. $110^{\circ} 39'$ W. On Christmas day, wind S. by E., lat. $35^{\circ} 40'$ S., lon. $95^{\circ} 20'$ W.; 26th, breeze again N.N.W. to W.N.W., swell from S.W. Made Coroumilla Point, January 2, 1838, and anchored $6^h 35'$ A.M., in the Bay of Valparaiso.

From the Coast of Chili or Peru, to the Sandwich, Society, Marquesas, and Pitcairn Islands, by Mr. G. Biddlecombe, Master of H.M.S. *Actaon*:—On leaving the coast, run into the S.E. trade-wind, or in lat. 20° S., as soon as possible, where you will generally have strong easterly winds and fine weather; you may then stand to the westward in that latitude till you bring Pitcairn Island to bear about S.W., when you should steer for it, taking care not to get to the westward of the island, as the current runs strongly to the westward, owing to the prevailing easterly wind, except about December and January, when a northerly or N.W. gale sometimes sets in.

From Pitcairn Island you will be enabled to shape a course for the Marquesas, taking care then to keep to the eastward, as the S.E. or S.S.E. trade blows through the islands.

On leaving the Marquesas, cross the equator, if possible, to the eastward of 145° W., as you will then be enabled to steer for Owhyhee, or a degree to the eastward of it, should you fall in with the N.E. trade early, although you seldom meet it till you are in lat. 10° N. The variable winds are generally westerly, and the current runs with the wind; but if you get easterly variables you may expect to be set a long way to the westward, as the currents run more strongly in that direction than any other. You should, therefore, cross the line well to the eastward, to ensure your fetching to windward of Owhyhee. In passing Owhyhee, do not go nearer than 40 miles to it, as vessels often get becalmed for many days together under the land.

On leaving the Sandwich Islands, you should stand South till in the latitude of the southern part of Owhyhee, when you should haul your wind to cross the line, if possible, in the longitude of Tahiti, as the S.E. trade breaks you off when you first make it, and then you do not fetch it within several degrees. It is tedious to get to the eastward in the latitude of Tahiti, owing to the strong westerly current; therefore you should lose no chance of preserving your easting.

After leaving the Society Islands for Peru or Chile, you should stand to the

southward into the latitude of 34° or 35° S., where you will in general find westerly winds which will take you to the coast.

A good passage may be made from Tahiti to Pitcairn by running through the southern part of the dangerous archipelago; but great care should be taken at night, there being so many dangers yet unknown, and not laid down on the charts.

Marquesas to Honolulu.—H.M.S. *Imogene*, leaving Resolution Bay, Marquesas, September 9, 1837, proceeded on a N. by W. course, keeping a good breeze from N.E. by E. to East, current westerly 25 to 30 miles in twenty-four hours; crossed the equator, September 13th, in lon. $142^{\circ} 40'$. September 15th, calms, which lasted for seven successive days, during which time only 220 miles were made. The variables thus lasted from lat. 50° N., lon. 144° W., to lat. 12° N., lon. 145° W.; current at this time easterly (see page 1243). Made Hawaii on the 26th, having had a fresh N.E. trade; anchored at Honolulu on the 28th.

Sandwich Islands to Tahiti.—There is great difficulty in making this passage across the trades. The whalers and all others speak with great doubt of fetching Tahiti from the Sandwich Islands. Capt. Bruce says that a vessel should keep to the northward until she gets a start of wind before bearing for her destination. In his passage between them in November, 1837, he had no variables near the line in coming South, and never could make easting on either tack, though he endeavoured by every means in his power to do so.

The *Imogene* left Karakakooa Bay, October 17, 1837; and, reaching the South point of the island after twenty-five hours' sail, bore away on a S.S.E. course with a fiery trade at E.N.E.; this failed on the 22nd; the ship was tacked to a southerly breeze, which lasted till the 25th, when a fresh S. by E. trade sprang up. Between the 21st and 25th an easterly current set for 30 to 35 miles a day (see page 1243); after that a westerly current of 16 to 40 miles per day was found. Every opportunity was seized to gain easting, and to get to windward of the meridian of Tahiti, but without success. The equator was crossed October 28th, in lon. $154^{\circ} 40'$, wind E. by S., having been on a bow-line ever since leaving Hawaii. Passed Bellingshausen Island November 5th; and, as the ship drew to southward, the wind gradually came to East, E.N.E., and N.E., always bringing the port directly in the wind's eye. November 8th, passed Rimitara; on the 9th, squalls, with most terrific rain; on the 10th, the wind veered to N.W., and finally S.S.W.; on the 11th, saw Rurutu. The wind now favoured the ship, and for the first time since leaving Hawaii she laid her course, and continued to do so; bearing W.N.W. 7 or 8 leagues, made Tahiti on the 13th, and anchored the same day at Papiète. Thus, had not a favourable change in the wind occurred in the latter portion of the passage, she would have been to leeward.

In the passage from Tahiti to Hawaii, Capt. Beechey says:—From the time we passed Maitea we endeavoured to get to the eastward, and to cross the equator in about 150° West longitude, so that, when we met the N.E. trade-wind, we might be well to windward. There is, otherwise, some difficulty in rounding Owhyhee, which should be done about 40 miles to the eastward to ensure the breeze. The passage between the Society and Sandwich Islands routes differs from a navigation between the same parallels in the Atlantic, in the former being

exempt from the long calms which sometimes prevail about the equator, and in the S.E. trade being more easterly. The westerly current is much the same in both; and if not attended to in the Pacific, will carry a ship so far to leeward, that, by the time she reaches the parallel of the Sandwich Islands, she will be a long way to westward, and have much difficulty in beating up to them.—(Beechey's Voyage, vol. i. p. 230).

Sandwich Islands to the Northward and Eastward.—The passages from the Sandwich Islands to any part of the N.W. coast of America are made by standing to the northward till the westerly winds are reached, when the run into the coast is easily made, taking care, however, if bound to a port to the southward of you, not to bear up till well in with the land, when north-westerly winds will be found to carry you down to the southward.

On this coast, as a general rule, the land should be made to the northward of the port you are bound to, as in almost all cases the wind and current both prevail from the northward from Vancouver Island to Cape Corrientes of Mexico.

Though lying between the parallels of 19° and 23° N., the Sandwich Islands are often visited during the winter months with strong breezes and gales from South and South and S.W., but for the rest of the year the trade-wind blows pretty steadily. In making a passage from thence to the coast of Chili or Peru, the best way is to stand across the trade as near the wind as the topmast-studding-sail will stand. This, as the direction of the wind is in general from E.N.N. to East, will enable you to make Tahiti, and pass the Society Islands by one of the clear channels to the westward of them. It is of little use trying to fetch to the eastward of these, as not only do you lose much time by hugging the wind too close, but also the strong current, which sets to the westward from 20 to 40 miles a day, is pretty sure to drift you that much to leeward; and even were this not the case, so difficult, tedious, and dangerous is the navigation amongst the archipelago of low coral islands which lie to the eastward, that, unless you can weather the Marquesas altogether, it is better even to bear up, than to entangle yourself in such a labyrinth. After passing the Society Islands stand on to the southward, till in or about the 30th parallel, when the westerly winds will be found. These will carry you into the coast; care being taken, as on the northern coast, not to bear up when within the influence of the southerly winds, till near enough to the land to ensure keeping them down to your port.

PASSAGES BETWEEN CALIFORNIA AND CHINA.

In the preceding passages we have alluded to a system of navigation almost exclusively governed by local causes, and which, so far, are in reality not restricted to the shortest distance between the respective places; but in getting beyond the verge of the trade-winds, and in laying a track which embraces so many degrees of longitude as the distance between the above countries, it becomes another matter which is the shortest as well as the best course to pursue. As we have described, in the passage between Australia and the southern part of America, the great circle course becomes fully developed.

In the voyage from East and West, of course the readiest method is to gain

the parallels of the trade-winds as soon as convenient, and by these means run down the westing, which in this case brings the ship to her destination.

But the return voyage is another matter, and the probably best track leads into very different regions. Thus the rhumb course from the Bashee Channel between Formosa and the Philippine Islands to San Francisco is about E. 9° N.; but the great circle course, from the same point, runs first N. 46° E., so that it touches the eastern part of the Madjico-sima Islands, inside or to the West of the Loochoo Islands, and then cuts the S.E. cape of Nippon. Farther eastward it attains the latitude of 48° N., longitude 169° W., and then proceeds East and E.S.E. towards San Francisco; so that San Francisco bears N.N.E. $\frac{1}{2}$ E. (*true*) from Hong Kong, and Hong Kong bears N.W. $\frac{1}{2}$ N. from San Francisco.

It will be very readily comprehended that a track so widely differing from the rhumb bearing of E. $\frac{1}{2}$ N. allows a wide range of choice for improving the passage, so that a ship immediately on getting off the China coast may bear at once to the northward, and availing herself of the S.W. winds which predominate to the northward, may also be assisted by the strong north-easterly current setting along the outer coast of the Japanese Archipelago, and probably extending its influence nearly to the American coast.

It is also a question whether it would not be advantageous to make the first portion of the passage inside the Japanese Islands, and enter the North Pacific by the Strait of Tsugar or Sangar; as the most direct track is not very far distant from such a course, and cannot be by any means lengthened by pursuing it.

This single instance will serve to direct attention to the wide variation that the great circle course is from that ordinarily pursued. And by specially applying its principles to any other points on the western coast of America, and the ports on the opposite side of the Pacific, it will be manifest that a very great range of ocean is left open to the navigator.

COAST OF CHINA.

The navigation of the coast of China properly belongs to another division of the world, and its importance requires a work specially devoted to its elucidation; but as much traffic is now growing up between the American coasts, as well as the Pacific Islands, and the Chinese empire, we deem it advisable to add here a few brief remarks on approaching the different ports.

Ships from the North Pacific bound to the southern ports of China, as Canton, Macao, or Hong Kong, will sometimes pass to the southward of Formosa, through the channel known as the *Bashee Channel*. The South point of the Island of Formosa is in lat. $21^{\circ} 53'$ N., lon. $120^{\circ} 54'$ E. It is said that a reef projects from it.

To the South of it are the *Vela Rete Rocks*, in lat. $21^{\circ} 42'$ N., lon. $120^{\circ} 52'$ E. They are even with the water, and some of them above the surface. The channel to the North is safe, but violent rippings are sometimes met with.

Gadd's Rock, according to Capt. W. H. Smyth, is in lat. $21^{\circ} 42' 30''$ N., lon. $121^{\circ} 41'$ E. It is very dangerous, showing only sometimes, but is marked by breakers. It bears South from *Little Botel Tobago Sima*, a small island with some bushes on it, in lat. $21^{\circ} 56'$. It is steep-to. *Botel Tobago Sima* is in lat.

21° 59', lon. 121° 38' N. (centre). It is high, 3 or 4 miles in extent, and seen from S.S.W. or N.N.E., appears like a saddle, visible 16 or 17 leagues from the mast-head.

The *North Bashee Islands* form the South limit of this channel. The North island is in lat. 21° 9' N., lon. 122° 0' E. There is another smaller one to the South of it like it, not to be seen very far off, and to the North of the larger high island, in lat. 21° 3' 30" N. This generally makes in the form of a peak, and may be discerned 13 leagues off. Ships passing through the Bashee Channel should keep well over toward these islands, to avoid the Vela Rete and Gadd's Reef. Typhoons happen in both monsoons, and the weather is generally very unsettled hereabout.

Farther to the West is the dangerous *Prata Shoal and Island*. It is of coral, level with the water in many parts, but slightly covered in others. The island in the centre is a low coral patch, of considerable extent, covered with coarse grass and shrubs. It is in lat. 20° 42' 55", lon. 116° 45' E.; N.E. part of the shoal, lat. 20° 47' N., lon. 116° 42' 15" E.; West part, lat. 20° 43' N., lon. 116° 41' 45" E. The currents are very strong and irregular, and the greatest caution is necessary to avoid them. H.M. screw-ship *Reynard* was totally wrecked here in 1851, in consequence of their unknown influence.

There does not appear to be any dangers in the open ocean to the East of Canton beside this.

The ENTRANCE to the CANTON RIVER is marked by the *Grand Ladrone Island*, in lat. 21° 57' 10" N., lon. 113° 44'. It is a steep and bold island, the N.W. part forming a round mount or dome, higher than the other part, and visible 9 leagues from a ship's deck. Although most of the islands here are high, this is unlike them, but being the outermost and different in appearance, it is made the standard position for vessels going to or leaving Canton.

The *Little Ladrone Island* is just to the West of it; the channel between is too narrow for use. The western side of the channel is the island and flats of *Samchow*. On the East side of the channel is *Potoe* or *Passage Island*, in lat. 22° 2' 6", bearing N.W. by N. from the N.W. end of Little Ladrone Island, 4½ miles off. It is a flat, sloping rock, but should not be approached too closely.

In approaching Canton River during the S.W. monsoon, ships endeavour to make the Grand Ladrone, bearing about N. or N. by E., and then run up into the river by the western channel; but late in the season, when the winds incline easterly, or in coming from the North or eastward, as would be the case from the northern portions of the Pacific, it is prudent to make the *Great Lema Island*, and so in by the Lema Channel.

The *Lema Islands* consist of three large and one small island, the largest 6 miles long by 1½ miles broad, of moderate height and undulating appearance. The N.E. end is in lat. 22° 4' 45", lon. 114° 18' 30" E. The *Lema Channel* enters between this and the *Poo-toy Islands* on the North. It is about 2 leagues wide, and very safe. This channel should be always adopted in the N.E. monsoon.

From the North end of the Great Lema, the course is about West to pass to the northward of *Lingting Island* toward the Lantao Passage, above Macao. Lingting is of considerable height, terminating in a conical peak. It may be passed on

either side, but to the northward is preferable. Having passed $1\frac{1}{2}$ or 2 miles distant, steer West for the Lantao Passage, between the *A-chow* and Chichow Islands, and then round the S.W. end of Tyho or Lantao Island, to the northward for Lingting, or the westward for Macao, as occasion may require.

MACAO, as is well known, lies at the entrance of the Canton River, on the West side, in lat. $22^{\circ} 10' 30''$, lon. $113^{\circ} 32' E$. Capt. P. Heywood's excellent plan, published by Mr. Laurie, will afford quite sufficient guide to run through the Typa into the harbour. Here pilots may be had for Canton; but it may be stated that the river appears the safest to navigate in the world.

CANTON FACTORIES are on the North side of the river, in lat. $23^{\circ} 7' 10'' N.$, lon. $113^{\circ} 15' 0'' E$.

HONG KONG, the British settlement, lies to the North of the Great Lema Island. Its greatest length is 9 miles, its breadth 5 miles. It is very uneven, rising into innumerable ridges and peaks; the highest, *Victoria Peak*, is 1,825 feet high. *Victoria* is the capital of the colony, and is on the North side. To the East of it there is a hillock, near the house of the Morison Education Society, which was carefully ascertained by Sir Edward Belcher to be in lat. $22^{\circ} 16' 30'' N.$, lon. $114^{\circ} 8' 30''$. The approach to it from the S.E. of the Fathion Channel is open, and inside the anchorage is perfectly safe.

With this we will close this chapter, with a feeling of the imperfection of the remarks contained in it. Our acquaintance with the most ready means of making a quick passage is certainly very far below present requirements. The Pacific navigation is now assuming a new character, and its traffic will, ere long, assume a regularity approaching to that of the western oceans; but until a more detailed experience is acquired of this, as of other features of the great South Seas, it is needless to enter into crude speculations, founded as they must be on imperfect data.

At a future and early day it is sincerely hoped that this, and many other defects which these volumes must necessarily contain, may be amply remedied.

APPENDIX.

I.—PROPOSED COMMUNICATIONS BETWEEN THE ATLANTIC AND PACIFIC OCEANS.

THIS question, which has attracted particular attention of late, is not a new one. It originated very soon after the Spaniards had ascertained that a narrow isthmus only separated the two oceans; and innumerable plans have been proposed, but the desired object, that of a navigable canal, seems, as yet, to be visionary.

The great impetus given to commerce, and the consequent addition to the importance of this subject, arising from the Californian movement, have led to at least a portion of the proposed communications being effected, in the railway now constructing to Panamá from near Chagres; but the great desideratum is still that of a canal, by the means of which ships may pass from either ocean without encountering the dangerous and circuitous route around Cape Horn.

The whole subject has been fully treated by Capt. R. FitzRoy before the Royal Geographical Society; and his paper appears in vol. xx., 1851, page 161, of their Journal. We therefore extract the following summary of what has been written or done in connexion with it from that paper.

The principal object in view is a navigable channel between the two oceans, through which the largest ships may pass, without breaking bulk or being lightened; the least object contemplated is a common waggon road, and between these limits other methods of transit will be noticed, which may be classed under four heads—namely, ship canals, boat canals, railroads, and waggon roads.

Men, horses, and mules have hitherto carried all that has been transported from sea to sea, where barges (bongos) or canoes have not floated. Much traffic through continued woodland, the rapid growth of vegetation, a soft, tenacious soil, and an extraordinary amount of rain, have hitherto destroyed and almost effaced such attempts at road-making as were effected in former days by the exertions of the early Spaniards, who employed slaves, and also availed themselves of Indian labour unscrupulously. In these regions roads must be made with large logs of wood (corduroy), or paved with stone, or else macadamized with an unusually thick layer of "metal," until an embankment (or "battery") fit for a railway can be constructed.

Excessive wetness, rather than humidity of climate, may be considered as the principal impediment to constructing roads, bridges, and the solid works of canals. This wetness causes a quick growth of vegetation, and a very rapid decay of all ligneous substances.

Miasmatic exhalations, or malaria, are engendered in low situations, especially near the confluence of fresh and salt water. Intermittent fevers, ague, and, at times, the pestiferous yellow fever, are common in such situations, but proper treatment cures the majority of cases, and those persons who have been thus "seasoned" do not again suffer from the same malady.

Another serious impediment to the permanence of solid works is, the liability of the greater

part of these countries to the destructive effects of volcanic convulsions; but Panamá and the narrow isthmus of Darien are free from their effects, which are felt on either side of them.

The southern part of Central America is not so subject to violent tempests as the northern, but they are sometimes experienced.

A few diminished tribes of Indians still inhabit the mountainous ranges of some districts. The Indians of Darien visit the adjacent islands and reefs. They are the descendants of the "Symerotes," who were never conquered by the Spaniards. This tribe still opposes, as of old, the exploration of certain tracts. There is yet another hindrance to the undertaking of any great works on the isthmus, and that is the great instability of the local government.

Irrespective of all these considerations, there is one chief requisite, one main point, to be insisted on, in connexion with any route—the indispensable adjunct of a good port. It would not be practicable to sail into any canal direct from the open sea, nor could the entrance of a canal be kept open without some protection from the heavy surf and sand or shingle.

Four principal lines for a canal have been hitherto recommended, to which may now be added three more, which ought not to be undervalued, and some others of less importance.

Taking the four principal lines in order, from North to South, the first is that between the Gulf of Mexico and Tehuantepec, and which may be called the *Mexican* line. The second is through the great Lake of Nicaragua, and is well known as the *Nicaragua* line. The third route crosses the isthmus, near Panamá, and is of course termed the *Panamá* line. The fourth, from the Gulf of Darien, by the Atrato River, to Cupica (Tupica?) Bay, is known as the *Atrato* and *Cupica* line.

Of the three next in importance, one is from Chiriqui Lake to Dulce Gulf; another, from the Gulf of San Blas, or Mandinga, to Chepo, in the Bay of Panamá; and a third, from Caledonia Bay, in the Gulf of Darien, to the Gulf of San Miguel.

The *Mexican* line has been alluded to on pages 259-60, part i. It leads over the Isthmus of Huasacoalcos, or Coatzacoalcos, from the mouth of a river so called, in lat. 18°, to the Gulf of Tehuantepec, near lat. 16°. It is about 120 miles across, in a straight line from sea to sea, and is nowhere very much elevated: about 700 feet above the sea is, however, the lowest summit level. The rivers are unimportant for navigation, and the adjacent coasts are frequently troubled by furious storms, and there is no port. Nevertheless, so much has been thought of this locality, that two surveys have been made of it; one, in 1825, by D. J. de Orbegoso and Don T. Ortiz, and another, in 1842-43, by Don J. Garay and Senhor G. Moro; and at the present time the legislature of New Orleans have considered the practicability of carrying out these plans.

The arguments in favour of this are the level nature of the intervening country; but its elevation would require a great number of locks. A railroad may soon become locally valuable; but for the present a good waggon road, from river to river, appears to be all that the insuperable disadvantages of the position will admit of. Other arguments are more favourable to this route: its climate is less unhealthy; supplies of stone and mortar are procurable; and native labour is to be had. Besides this, the proposed line is entirely within one territory. But this line can never interest the world at large. The Gulf of Mexico is not in the line of general intercourse between the two great oceans. This last circumstance will prevent it becoming more than of local value for the traffic between New Orleans and California.

The *Nicaragua* line has long attracted much attention; and public opinion in the United States, as well as in Europe, is at present rather in favour of this route. There is no geographical objection to the line; but most of the proposed terminations of this route are unfit for large vessels, except during fine weather, and they are exposed to gales of wind. Six branch lines from the great Lake of Nicaragua have been advocated, which will all be noticed.

Nicaragua Lake is so large, being nearly 90 miles long, and about 30 miles in width, that

artificial harbours, at the mouths of any canals opening into it, will be necessary. In the comparatively still water of the lake they might be constructed, however impracticable in the open sea, where no shelter exists for such operations. The depth of the lake seems to be irregular, from 2 to 40 fathoms and upwards.*

In the River San Juan there are rapids, and in the River Panaloya (or Tipitapa), which leads from Leon (or Managua) Lake, there is a sudden fall of 13 feet, caused by a dyke of recent lava. In both rivers there are places almost dry across during the summer; and in both the winter rains cause great floods, overflowing their banks, and inundating the low lands. It is evident, therefore, that these rivers could only serve as the principal feeders of canals, and that they themselves cannot be made navigable for large vessels.

It is said that the surface of Nicaragua is about 125 feet above the mean level of the Pacific Ocean; and that the surface of Managua Lake is about 28 feet above that of Nicaragua. From the Atlantic, at the mouth of the River San Juan, it is more than 80 miles to the lake, in nearly the mean direction of the river; and from Fonseca or Conchagua Gulf to the north-west part of Nicaragua the very shortest line that could be taken for a canal would measure more than 90 miles. It is more likely, however, that each of those distances would exceed 100 miles, including all bends; and, as the ground is very irregular, some idea may be formed, off hand, of the vast number of locks that would be required, of the delay, labour, and expense of towing ships through, and of the time which would be occupied. Between Realejo, which is by no means so good a port as had been usually supposed,† and Managua Lake, about 45 miles of canal would be required; and the highest level necessary would be about 212 feet above the Pacific; but at that elevation it is doubtful whether a sufficient supply of water could be then secured without an immense cutting, 11 miles in length, and not less than 70 feet deep (wide enough also for a canal), to convey a stream from Managua. From one ocean to the other not much less than 100 miles of canal would be indispensable, if the shortest lines were adopted; but probably nearer double that extent would be required if the longer route, to Conchagua, were followed.

The third proposed branch canal, from Lake Managua to Tamarinda, on the Pacific, has not been examined. The fourth proposition is from Nicaragua Lake to San Juan del Sur,‡ on the Pacific; but many difficulties appear in the way—a range of high land intervening, through which it would be necessary to cut a tunnel, 1 to 2 miles long, 120 feet above the lake, and of dimensions hitherto unattempted. How a sufficient supply of water could be obtained is a matter of mere conjecture. Besides these grave objections, the district abounds in volcanoes, and is subject to earthquakes.

The next branch line from Nicaragua is from the mouth of the Sapoa River, at the S.W. part of the great lake, to Salinas Bay (see page 230, part i.). It is said to be about 15 miles in length, half of which is by the river, and now navigable by boats. No exact survey has yet been made, but estimated levels and distances have been made by Dr. Oersted, in 1847. The lowest summit level is supposed to be only 130 feet above the lake, and about double that elevation above the sea. There is sufficient water, it is stated, to supply a canal at that elevation. Salinas Bay is surveyed, and known to be a good harbour.

The sixth proposition is to connect Nicoya Gulf (see page 227, part i.) with the southern part of Nicaragua, or *directly* with the River San Juan, by the help of the River San Carlos. In this case an available port exists in the Pacific, but a large extent of land intervenes between the oceans, which has not been surveyed, and may be found unavailable.

The respective peculiarities of these six branches, as they may be called, of the Nicaragua line, cannot yet be described minutely, because insufficiently explored, excepting that of the branch of San Juan del Sur. Enough, however, is known to discourage any attempt to construct either canal or railway, unless the Sapoa track should prove as eligible as

* See page 233, part i., where the lake and the proposed canals are described.

† It is described in pages 235—240, part i.

‡ See page 230, part i.

Dr. Oersted believes. Even then there are the disadvantages of the increasing inferiority of St. Juan (Greytown) Harbour, in the Mexican Gulf; of the difficulties of the River San Juan; the political instability of the three states, Costa Rica, Nicaragua, and the Mosquito territories; and last, though not least, the physical insecurity—volcanoes abounding, and relative elevations of land and water having been materially changed within the memory of living men.

No good road, on a large scale, could be made in this district, to be serviceable to commerce, on account of the great distances and frequent alternations of land and water conveyance.

While the discussion is pending, as to which is the best point for forming the communication, we have but few experiments, which of course, are far more valuable than speculations, and especially so in this question. A recent account, therefore, becomes still more interesting. It is of the successful ascent and descent of the Rio San Juan with a considerable number of passengers in transit between New York and San Francisco, the first of its kind. The *Pacific* steam ship left San Francisco July 14th, 1851, and reached the little port of San Juan del Sur on the 29th, after a passage of fourteen days sixteen hours. The writer of the account then took a mule and rode 18 miles to the city of Ravala, in three hours and a half; left in the steamer *Director*, on the Lake of Nicaragua, and reached the Rapids in twenty-one hours; thence taking the steamer *Sir Henry L. Bulwer*, passed down the most beautiful river to San Juan, on the Atlantic, in ten hours. Total time of transit, thirty-four hours and a half; which, it is stated, when Commodore Vanderbilt gets his men into good operation, may be reduced to twenty-four hours. Thus the times will stand as follow, when the arrangements are complete:—From San Francisco to San Juan del Sur, twelve days; from ocean to ocean, one day; and from San Juan de Nicaragua to New York, eight days; loss of time, one day: total, twenty-two days.

The passage up the Rio San Juan does not appear to be quite so simple a matter as that in the other direction. The *Sir Henry L. Bulwer*, on her first trip, had some government difficulties to overcome (relating to the charter of the navigation), but commenced her trial trip by getting aground; and getting off again, steamed up the river 8 miles in fifty minutes, and anchored for the night. Started the next morning up this most beautiful of rivers, according to the American account, passing the wreck of the *Orus*, lying in the middle of the stream, and, with some difficulties and checks, succeeded in passing safely up the rapids of the Machescales, thence reached San Carlos in about sixteen hours' steaming from the entrance.

This successful opening of the Nicaragua route certainly gives a new feature to the whole matter. The exclusive right to the Nicaragua route has been granted by the Nicaragua government to Messrs. Vanderbilt, Whitt, and Co., and it is the present intention to construct either a plank-road or railroad, probably the former at first, between the lake and San Juan del Sur. The intervening space is said by the same authority to be so level, and only 12 miles, that a horse can trot over it in an hour.—(See New York Herald, August 16th, and Times, August 28th and 29th, 1851.)

The third line is by Panamá.

Numerous explorations have been made here. Canals have been proposed, and various lines have been more or less closely examined. Four routes have been critically surveyed throughout the whole distance by Lloyd and Falmarc, by Morrell, Garella, and Hughes: along the last line a railway is now in progress. This adopted route leads from Limon, or Navy Bay, to Panamá city, passing by Gorgona. It is to be carried about 36 miles, over elevations of nearly 300 feet, through a tunnel, and over large viaducts and bridges.

Respecting the termini of this railway, Chagres is well known to be unfit for large ships, but Limon Bay has space and depth of water towards its outer part amply sufficient. Unfortunately it is open to the North winds, which drive in a very heavy sea, and half of

the bay is so shallow that at such times it is covered with surf. A breakwater has been proposed, but to be effective it must be so gigantic as to exceed all similar works. Limon Bay is not at present a safe port for shipping. It is practicable to excavate a large wet dock between Manzanilla Island and the main land, at the terminus of the railroad now in progress; and if such a work were executed, Limon Bay would then become a useful roadstead to this harbour.

In Panamá Bay tolerably spacious and sheltered anchorage (see pages 212—219, part i.), with access to works *carried out into the sea*, may be found in the bay, 2 or 3 miles from the city. The anchorage, though usually tranquil, has been visited by severe tempests. The great rise of tide at Panamá, from 2 to 4 fathoms, would much facilitate operations, and would also favour the construction of dry docks, so much wanted in the Pacific; but at present the proposed terminus is 2 miles from the nearest anchorage of ordinary shipping, across open sea. This is a serious inconvenience to the transporting of merchandise.

From Limon Bay to Panamá is about 33 miles in a direct line. Many rivers and ranges of hills intervene. Floods sweep the low ground during the rainy season. The rivers are so irregular, that they can only be used as feeders for a canal.

The works necessary for a ship-canal must be on the greatest scale, not only if the lowest summit level to be passed be nearly 300 feet, which is that of the railroad, but if Garella's plan, avoiding a greater elevation than 160 feet, should be adopted. Morrell's plan states that a line may be taken between the rivers Trinidad and Caymito, in which the highest elevation does not exceed 40 feet above the sea. But this account is contradicted by other authorities. If such a low summit level of the land exist, a channel might possibly be made from sea to sea without a lock, navigable by the largest ships. In order to attain the lowest possible level, Garella proposed to excavate a tunnel 125 feet in interior height, 97 feet wide, and nearly 3 miles in length! With such an enormous work, and about thirty-three locks, he proposed to accomplish the grand object. Lloyd suggested a canal from Limon Bay into the Chagres, and a communication between the waters of the South by railway, if not by canal. Whether a supply of water could be secured for a canal at the elevation of 200 or 300 feet seems to be doubtful.

As no safe port is now available about this part of the isthmus, except Porto Bello, well known for its unhealthy climate, and formerly termed "the grave of Europeans," it may be doubted whether even a railroad will be remunerative; but assuredly there are not at present sufficient inducements to warrant the employment of private capital on a canal.

The fourth principal route is the *Atrato and Cupica* line. It is alluded to on pages 207-8, part i.

From the inner part of the Gulf of Darien (called Candelaria, Choco, or Culata), up the River Atrato, and along part of the River Naipi or Naipipi, and thence across to Cupica Bay, is a distance of 114 miles by estimation, of which about 19 only are overland. Two-thirds of this distance (76 miles) are said to be now navigable for large ships, and half the other third (or 19 miles) by loaded boats. It is supposed that a canal may be excavated through the small remaining distance (19 miles) without extraordinary difficulty; and it is proved that it might open into an excellent port, that of Cupica (or Tupica), in which are coves *perfectly sheltered, with deep water in them close to the shore.*

Lieutenant Wood, R.N., the officer who recently surveyed it, in H.M.S. *Pandora*, went over the ground; he considered that the most elevated part was between 300 and 400 feet, the rapid ascent being from Tupica Bay. On this upper part is comparatively low land, through which a canal may be cut between the partly navigable portion of the Naipi and the Bay of Tupica. That a road of any kind may be made there readily, is shown by the fact that a boat has been dragged across in a few hours.

We need not relate all the particulars for and against this scheme, as recited by Capt. FitzRoy, and they are numerous and recent. His conclusions are as follow:—"There can

be little doubt that in the running of watercourses, including that which leads into Cupica Bay, a line may be *thrown*—to the Atrato, if not to the Naipi—which would be suitable for a large canal. Such a project is by no means new. It was suggested to the Spanish government by a very intelligent Biscay pilot, Gogueneche by name, at an early date; but so cautious were the Spaniards to prevent rather than encourage any scheme that might facilitate access to the West coast of America, or extend a knowledge of the mining localities near Darien Gulf, that it was prohibited, *on pain of death*, not only to navigate the Atrato, or pass by that river, but even to *propose* to take advantage of it, in any way, as a route.

In this vicinity, if our premises are correct, and the climate can be withstood (neither of which there is good reason to doubt), we may suppose that a great canal is feasible, and that there is a substantial foundation for opinions in favour of attempting to execute such a work on a scale that would make it available for the largest ships of all nations.

For a railroad, or even a waggon road, the neighbourhood of the Atrato cannot be suitable, because of the extensive swamps and low marshy land affording no solid foundation. Roads can undoubtedly be formed more advantageously elsewhere; by *this* line an effective communication can only be made by water.

The four principal lines have been thus summarily examined, and the result is that only one, the Cupica and Atrato route, appears now to offer a reasonable prospect of encouragement to undertake the construction of a *ship-canal*.

Referring to other lines *suggested*, but not yet sufficiently explored, between *Chiriqui Lagoon* and *Dulce Gulf* (see page 226, part i.), a communication has recently been proposed by a French company, who have obtained a grant of land for the establishment of a good road in the first instance between these points, which are good ports.

Between the Panamá line and the Atrato there are at least three places where surveys are very desirable. First, from San Blas or Mandinga Bay to near Chepo, a distance of 27 miles. The Indians have refused to allow Mr. Hopkins and Dr. Cullen to pass through their countries; and this is an incentive to explore the locality, as the natives drag their canoes across the tract in question.

Second, from Caledonia Bay to the Gulf of San Miguel, in Panamá Bay. Over one of the tracts between these Wafer travelled in 1681. It was also selected by the unhappy Scotch colony (of 1695—1700) as the site of their settlement; and after their utter ruin and dispersion, the leaders wished to organize another expedition to the same spot, one reason for which was opening a *way through the isthmus which there is so narrow*.

Between the bottom of the Gulf of Darien (or Choco) and San Miguel there may be means of effecting a good passage by land as well as by water; but this tempting situation—low, narrow, nearly intersected by rivers, and lying between excellent harbours—has not lately been explored. On all accounts this is an extremely interesting quarter."

This embraces all the points where projects have been made, as enumerated by Capt. FitzRoy. The vast importance of the subject we need not dwell on. Other works will afford minute details of each scheme, and the following list of authors will include all that has been written:—

LIST OF AUTHORITIES.—Admiralty (Hydrographic Office); Alcedo; Bailly; Burney; Byam; Chevalier; Cochrane; Coutin; Cullen; Dampier; Davis; Edwards; Falmarc; Galindo; Galisteo; Garay; Garella; Guzman; Hamilton; Hopkins; Hughes; Jefferys; Juan; Lawrence; Liot; Lloyd; M'Queen; Mollien; Morrell; Louis Napoleon; O'Leary; Pitman; Purdy; Scarlett; Stephens; Squier; Ulloa; Wafer; Watts; Wheelwright; Wood; and the standard works of Humboldt.

We may conclude these remarks with some other plans which have been made for the northward.

A proposal has just been issued from the Mexican government, under its president, J. J. de Herrera, dated May 18, 1849, by which advantages are offered to any contractor who shall construct a railroad from Vera Cruz to the capital, and thence to some port in

the Pacific, taking the railroad already constructed from Vera Cruz to Molimo, an extent of 3 leagues.—(See Times, August 13, 1851.)

A line, unnoticed by Capt. FitzRoy, is alluded to on page 242, part i., from Conchagua, by the Sirano River and the Plain of Comayagua to the Jagua River, falling into the Bay of Honduras.

Another, but more gigantic, scheme is the "Imperial Atlantic and Pacific Railroad," proposed by Mr. Asa Whitney, of the United States. It is to form a line of railway from Quebec, passing close to the northern shore of Lake Superior, and crossing the Rocky Mountains at an elevation some 3,000 feet less than at the South Pass, and reaching the Pacific at Frazer's River, if not Nootka Sound. The initiatory portion of this extensive plan, between Halifax and Quebec, is now in process of determination for commencement. This proposition is to avoid some insuperable difficulties which exist in the proposed New Orleans and San Francisco Railroad.

II.—COAL IN THE PACIFIC.

The existence of coal in various parts of the Pacific is a question of very considerable importance in connexion with its navigation; for although the system of steam transit in the Pacific is as yet in its infancy, its extension must be mainly dependent on this circumstance. As far as the coast of South America, however, is concerned, and that is one of the chief fields for its development, the present system of freight, of coal out and guano home from Callao, brings Newcastle into very close collision with the native coal, so much so, it is said, as to neutralize the advantage of site.

It is more than probable that this may be overcome, and the coal of the Pacific may be brought into important operation ere many years be past. Indeed even now it is said that Valparaiso may soon more than successfully compete with its transatlantic rivals.

We will give a brief enumeration of various sites where coal has been found, as related in the body of the work.

Strait of Magalhaens.—Coal has been found in the Strait of Magalhaens, at Sandy Bay (Sandy Point), 30 miles North from Port Famine (page 11, part i.). The first vein is 7 miles inland from the bay, and 40 or 50 feet above the level of the river, and is about 30 or 40 feet in depth. It could be worked with great ease, but can be of little use until a road to bring the coal down to shipping be made. It is a sort of brown coal or lignite.*

Chiloe.—Capt. FitzRoy tells us that there is a good deal of coal in Chiloe (as in the Island of Lemuy), but of an inferior description. It is not true coal; lignite would be a better name. It, however, burns readily (see pages 88—93, part i.).

Concepcion, Chile.—Coal is abundant in this neighbourhood. It is found, and there are some mines worked by Dr. Mackay, between Talcahuana and Old Penco. It is also found at *Colcura*, to the South of Concepcion. The coal here is real coal, of the cannel variety (see pages 108-9, part i.).

(Colombia.)—Though not exactly of the nature of coal, a spring of mineral bitumen is mentioned by Dampier as existing (and it still exists) near the village in the bay, on the North side of Santa Elena Point, lat. 2° 11' S., lon. 81° 2' W. It is close by the sea, and becomes inspissated by heat (see page 198, part i.). There is another of these bitumen springs in the bottom of the bay, between *Point Dume* and *Point Vicente*, in *Upper California* (see page 321, part i.). It might be worth consideration, whether this bitumen might not be made available, by combining it with the inferior coal of the Pacific, and thus making a fuel similar to Grant's patent fuel, so useful for steam vessels.—ED.)

Galapagos Islands.—Dr. Coulter states that in a valley in the middle of Chatham Island he discovered coal in large quantities, and that an immense supply might be obtained.

* Report by Capt. T. Henderson, H.M. steam vessel *Sampson*, October, 1848: Journal of the Royal Geographical Society, 1850, pp. 151-2.

"It quickly ignited, flamed, and burned up after the cheerful manner of Kendal (query, Cannel) coal." This statement has been denied. Indeed it is difficult to understand how coal should have existed unchanged among such a mass of cinders as James Island appears to be (see page 975, part i.).

Columbia River.—Coal, or rather lignite, exists in the Cowlitz River (see page 367, part i.).

Admiralty Inlet.—A recent number of the "Oregon Spectator" says that coal has been discovered in this inlet, of a superior quality, and very abundant. (July, 1851.)

Vancouver Island.—An important discovery was made in the North part of Vancouver Island of some extensive veins of coal. They have been worked in Port M'Neil, on the N.E. side of the island. An account of this is given on page 408, part i. This coal resembles ordinary Newcastle coal, containing a superabundance of earthy matter.

Cook's Inlet, Russian America.—Capts. Portlock and Dixon state that in walking round Coal Bay, in Graham's Harbour, they discovered two veins of cannell coal in some hills just by the beach, about the middle of the bay (see page 485, part i.). That coal is abundant somewhere about here is evident, from Vancouver's finding some pieces of coal (resembling cannell) on the beach near the S.W. end of Coulgiack Island, in this inlet (see page 487, part i.).

Schumagin Island, Alaska.—Admiral Lütke tells us that on the West side of *Zakharovskaya Bay*, on the N.E. side of Ounga Island, are some beds of coal, arranged in perfectly horizontal strata, at 100 yards above the level of the sea. The Russians had commenced working them for use. On the North side much petrified wood is met with (see page 399, part i.).

Aleutian Islands.—Coal is found on the shore of Derbinskoi Strait, separating the islands of Tigalda and Abatanock, in the Krenitzin Islands. This is all we know of it.—(See page 505, part i.).

Behring's Strait.—Capt. Beechey states that Cape Beaufort, near Icy Cape, is composed of sandstone, and is traversed by narrow veins of coal lying in an E.N.E. and W.S.W. direction; some pieces, which had been thrown to the surface by some burrowing animal, burned very well (see page 549, part i.).

Japan.—Coal exists in this sealed empire; of course, at present, useless to Europeans. Von Siebold saw a coal fire at Koyanosi, in the Island of Kiusiu, on his journey to Jedo. He visited and descended halfway down the mine at Wukumoto; it was bituminous coal, and he was informed that the beds were many feet thick in the lower part.

New Zealand.—There are two or three places where coal is abundant, though at present not much worked. Of course the mines of the Hunter's River, New South Wales, would seriously interfere with any extensive operations at present. Massacre Bay is the first place to be noticed: here, at Motupipi, on the eastern side, a flat on the shore is formed of bare coal, of good quality, it is stated. It has been worked since 1845 by some Wellington colonists (see page 761, part ii.).

Near the Clutha or Molyneux River coal exists. A black cliff of coal, above 12 to 20 feet above the sand, is found to the North of the mouth of the river, at Coal Point. It is inaccessible from sea. The same vein has also been found about 8 miles above the mouth of the Molyneux River, and 4 miles due West of Coal Point. It is stated to be *splint* coal, of first-rate quality (see page 782, part ii.).

At South Wanganui Harbour, on the N.W. coast of the Middle Island, are some extensive coal beds, easy of access, probably portions of the same formation as those in Massacre Bay, above referred to.

Coal has also been found on the East side of the North cape of New Zealand (see page 708), and about 100 miles above Petre, near Cook's Strait (see page 745).

We have thus alluded to several places where this valuable mineral is now known to exist; doubtless this list is imperfect, and future investigation will demonstrate that it is to be found in numerous localities besides these here named. Of the qualities of the coal at these places of course little or nothing is known; but should that of Cook's Inlet, for

example, be good, it is not so distant from the line of traffic as is sometimes supposed, as it would not add to the length of a voyage from California to China by touching here, as has been shown on page 1319.

III.—WHALES.

Extracts from the Appendix to a Narrative of a Whaling Voyage Round the Globe, from the Year 1833 to 1836, by Frederick Debell Bennett, Esq., F.R.G.S., Fellow of the Royal College of Surgeons, London. 2 vols. London, 1840.

1. The essential points in which cetaceans differ from quadrupeds may be thus briefly enumerated:—An absence of cylindrical and hollow bones; a rudimentary anchylosed (united together) state of the bones of the neck; a modification of the anterior extremity and tail, by which these members are adapted to the office of fins; deficiency in posterior extremities, and perfect *pelvis*; inability to respire through the mouth, or uttervocal sounds; copulation *more humano*; and, probably, a higher standard of natural heat.

The structure which distinguishes cetaceans from the other inhabitants of the deep is their peculiarity of respiration. By a peculiar modification of the air passages in whales, the *larynx* (or aperture of the windpipe), instead of opening behind the tongue, as in land animals, is continued to the spouting canal. Hence respiration cannot be performed through the mouth, but only through the spiracles or nostrils; nor can any tones or voice be emitted except through the spiracles, which are badly adapted for such a purpose. It is yet an unsettled point whether the spiracles of spouting whales are entirely for respiration, or whether the water received into the mouth with the food is also ejected with it. But the spout seems nothing more than the vapour of their breath, and, as in the case of the dolphin, its breathing may be heard at times without any spout. Perhaps, however, both functions are performed by it in a distinct manner.

Cetaceans are naturally divided into three distinct tribes or families. The first of these is composed of whales which feed on the vegetable productions of the sea or rivers, and which are provided with teeth adapted to the nature of their food. They may be regarded as representing the *herbivorous* class of quadrupeds. They include in their number the *Lamantins* and *Dugongs*. These whales do not blow or spout.

The second family is formed by spouting whales, of predatory habits. They subsist chiefly on fish and sepæ; have teeth only adapted for the prehension or coarse division of their food; and may be said to represent the *carnivorous* quadrupeds of the land. They are exemplified in the cachalots, porpoises, and dolphins.

The third division comprises the whalebone whales, as the rorquals and mysticetes (true or right whales). In the place of teeth, their jaws are provided with plates and filaments of whalebone (*baleen*), which are moveable, extensile, and adapted to retain, as in a net, the medusæ or small marine animals which form the only food of this colossal family. In habits they will bear comparison with the *insectivorous* class of terrestrial quadrupeds.

The SPERM WHALE, or Cachalot (*Catodon macrocephalus*, Lacep; *Physeter macrocephalus*, Shaw) is the largest as well as the most valuable of the southern whales. It is known to the English as the sperm or anvil-headed whale; the French name it the *cachalot*, the Germans the *pottfisch*.

It affords the valuable commodities, sperm oil, spermaceti, and ambergris. This is the only species of cachalot with which the southern whalers are acquainted; and, in the opinion of the accurate Cuvier, is the only one that exists; certainly, if the many kinds distinguished by the names of round-headed or lesser cachalot (*Physeter catodon*), cylindrical cachalot (*Physalus cylindricus*), sharp-nosed cachalot (*Physeter microps*), and high-finned cachalot (*Physeter tursio*), none but the last (which is said to be an inhabitant of the North Seas, having a tall dorsal fin, and attaining the length of 100 feet) differ in the descriptions given of them from the ordinary sperm whale of the South Seas. The largest size recorded of the sperm whale is 76 feet in length, girth 38 feet; but 60 feet is an average length. This is the

male animal; the adult female does not exceed 30 feet, or at most 35 feet. A full-grown fœtus, measured by Dr. Bennett, was 14 feet long by 6 feet in girth. Whalers express the size by the number of barrels of oil it produces. A large male has produced one hundred barrels, and a female fifty barrels, but from seventy to ninety barrels for the male, and twenty to thirty barrels for the female, is the usual average.

The form of the sperm whale is colossal without symmetry; its prevailing colour of a dull black, sometimes marked with white. Its enormous head is fully one-third of the bulk of the whole animal, and much exceeds that proportion in weight. The body presents no very peculiar features; the tail, or flukes, is both the principal organ of progression and a powerful weapon of defence.

A very large proportion of the head of the sperm whale is composed of soft parts, situated in front of the cranium, and named by the whalers the "junk" and "case." The "junk" is a solid mass of soft, yellow, and oily fat, based on the upper jaw, and forming the front and lower part of the snout; in a large whale this part weighs between two and three tons.

The "case" and its boundaries constitute the upper and anterior portion of the head. The cavity to which the term "case" is more immediately applied is situated beneath, and to the right of, the spouting canal, and corresponds to nearly the entire length of that tube. It is filled with a very delicate web of cellular tissue, containing in large cells a limped and oily fluid, which is liberated with the slightest force. The quantity of fluid (which is chiefly spermaceti) contained in this singular receptacle is often very considerable; fourteen barrels, or nearly 500 gallons, have been taken from the case of one whale.

So vast an accumulation of relatively light structures in the head of the cachalot is obviously intended to render this part of the animal peculiarly buoyant, to ensure its correct position in swimming, and, by counteracting the weight of the bony structure of the head, to raise the spiracle above the surface; these objects are attained in the Greenland whale by similar accumulations of fat in the lips and tongue. The tongue of the cachalot is small, shaped like that of an ox, and occupies a space at the back of the mouth. The eyes are small, not more than two inches long, and one broad in their aperture.

The true teeth of the whale are situated only in the lower jaw; and when the mouth is closed they are received into corresponding sockets in the soft parts covering the upper jaw. Their number varies greatly in different individuals, from thirty-nine to fifty. The upper jaw is not entirely toothless, there is a short row of teeth on each side, deeply seated in the gum.

The skin of the sperm whale emits a slight peculiar half-fishy odour; it is quite smooth, and has a very clean appearance, which distinguishes it from the true whale of the South. It is composed of the same parts as the quadrupeds. The epidermis or scarf skin is exceedingly delicate, not thicker than goldbeater's skin. Beneath this is the "black skin," the *rete mucosum*, which, when exposed to the air, becomes polished, and may be peeled off in sheets; it has powerful alkaline properties (*free soda*), and when burnt forms an essential convenience to the whaler, by enabling him readily to cleanse his ship and clothes from oil. Filaments or nervous papillæ rise from every part of the skin as a thick mat; when separated from the layer of colouring matter they are flaccid and colourless, and may be smoothed in different directions like the pile of velvet or hair, and hence is sometimes called by the sailors "the hair of the sperm whale." Their distribution, &c., would lead to the opinion that this whale is endowed with an acute sense of touch, which is also confirmed by the rapidity with which the animal responds to the contact of an extraneous body.

The envelope of lard, or blubber, is of compact texture, perfectly white, and without odour. It varies in thickness (according to the size of the whale, or the part of the body from which it is removed), from four or six inches to eight or fourteen. The breast, dorsal hump, and upper margin of the tail, afford the thickest blubber on the body.

The sperm whale is gregarious, and usually occurs in parties which are termed by whalers "schools" or "pods;" a school may contain from twenty to fifty cachalots, and is composed of females, or "cows," and their young, and associated by at least one adult

male, or bull, of the largest size. The smaller associations, or pods, consist of young or half-grown males, which have been driven from their maternal schools, and sometimes of large and adult males: when a solitary or "lone" cachalot is observed, it almost invariably proves to be an old bull. Two or more schools often coalesce, and form a very large assemblage, known as a "body of whales." On some tracks of ocean, peculiarly favoured as their haunts, the number of sperm whales seen together is beyond all reasonable conception. At particular times and places the ocean may be seen for several miles around the ship, strewn with a constant succession of spouts, denoting a greater number of cachalots than would fill three or four ships with their oil.

Notwithstanding its unwieldy bulk, this whale is not deficient in activity; it will, when struck, tow a boat at the rate of 15 miles an hour; but this does not continue long. Under ordinary alarms its speed averages 8 or 10 miles an hour.

As long as the cachalot continues on the surface of the sea, it casts from its nostril a constant succession of spouts; each jet following each other after an interval of ten or fifteen seconds, with a regularity highly characteristic of this species of whale. This respiratory jet or spout has the appearance of a thick and white mist; it ascends obliquely upwards and forward; seldom rises higher than 6 or 8 feet; remains suspended in the air but for a short time; and is sent forth from the spiracle by one continued effort, accompanied by a rushing sound, resembling that of a moderate surf upon a smooth beach; it is very peculiar, and a practised whaler can tell the vicinity of a cachalot by it in the night.

When about to descend, the cachalot assumes a vertical posture, raising its flukes perpendicularly and leisurely in the air, which action distinguishes it from most other kinds of cetacea. The sperm whale cannot remain beneath the water beyond a limited time; one hour is perhaps the average time for a large whale; but whatever may be the time that a whale remains under water after making a formal descent, it subsequently adheres to the same period with such regularity that its risings may be timed by a watch with considerable accuracy.

Their ordinary food is the cuttle-fish or "squid" (sepia), many kinds of which are rejected from the stomach when it is attacked, and among the matter thus thrown up are found enormous masses, evidently but the mere fragments of the body of some vast cuttle-fish or gigantic "squid." But it may occasionally indulge in other food, as some whalers assert they have seen cachalots throw up rock-cod and even sharks.

The habitation of the sperm whale is more peculiarly in the central and fathomless waters of oceans, or the vicinity of the most abrupt coasts. Occasionally, though but very rarely, they frequent the shallower seas, so commonly the resort of the true whale. The geographical range of this species is very extensive, since no part of the aqueous globe, excepting the polar seas, is altogether inimical to their habits, or free from their visits. In the southern hemisphere they are known to extend as high as between lat. 60° and 70°, or off the shore of the South Shetland Isles. In the northern, their boundary can be fixed with more accuracy at about lat. 60°; for, although the species has been observed on the South coast of Greenland, and as high as the corresponding latitude off the American and Asiatic continents, it is unknown to the whaler in the Arctic ocean.

In all the intermediate climates the sperm whales have been found more or less abundant. They have been taken in the Mediterranean, in the English channel, and an individual in the Thames. In the warm seas, within the tropics, the cachalot is sought with the greatest success; more especially and uniformly in the "line currents," which extend from the equator to about 7° North and South latitude.

Large parties of these whales have been remarked to affect particular spots at distinct times; though it has not been ascertained whether they are sufficiently regular to be considered as seasonable: when *seasons* are spoken of, it applies less to the periodic presence of the whales in the regions referred to, than to the convenience of whale ships in regard to the weather, &c. Thus the "Japan cruise," in the Pacific, extends from 20° to 40°

North latitude, commences with the spring months, April and May, and concludes with the autumnal months, September and October, or when the accession of inclement weather may be expected in that region: although there is no reason to doubt that whales continue in its waters during the entire year. While driven by winter weather from the North, the whaler occupies his time in the more genial climates of South America and the equator, or takes the "off-shore season." The same remark applies to the sperm fisheries in the Indian seas, where its seasons are equally influenced by the variations in the monsoons. Nevertheless the natives of the Society Islands expect to see the cachalot around their shores only during the months of April or May, or, as they express the time, "when the *vis*, (hog plums), are ripe;" and whalers consider that from September to December are the most profitable months for cruising on the equator.

Vast tracks of ocean may be cruised over without the slightest trace of the sperm whale being perceived, whilst other and often very limited extents of water will exhibit the species in great abundance. Much of this apparent caprice, however, depends upon natural causes. Powerful currents on the shore, intervening between two currents setting in opposite directions, are the favourite resorts of this whale, and doubtless where its food is found in the greatest abundance, as swept together by these local streams.

Hence, wheresoever currents are denoted by these commotions, marine animals, as the floating shell-fish, *Janthina*, *Hyalæa*, and *Cleodora*, or other mollusks, as sea-lizards (*Glaucus*), *Velella*, *Porpita*, &c., with myriads of medusæ, forming what the whalers term "thick water," cachalots may reasonably be expected; and their appearance often coincides in a remarkable manner with the presence of such natural indications.

As a fishery in the immediate vicinity of Europe, the sperm whaling may be traced back to a very early date. But as a systematic plan, it commenced with the American colonists about the year 1690; and the English, until the declaration of independence, were content to receive sperm oil, &c., as a colonial produce. But in 1775 ten ships were sent out from Great Britain for the sperm whale fishery. This was chiefly through the means of the highly respected firm of Messrs. Enderby, whose name must ever be connected with the Pacific Ocean. In 1791 this fishery, by government bounty, attained its maximum. The first ship ever sent into the Pacific for the sperm-whale fishery was the *Emilia*, the property of Messrs. Enderby, in the year 1788. She made a short and successful voyage, and opened a wide and successful field for future exertions. In the year 1819, the British whale ship *Syren* occupied as a cruising ground the distant portion of the Pacific, since so familiarly known to whalers as the coast of Japan, and which, for a long series of years, has proved so prolific a resort of the sperm whale, that, at a comparatively recent period, when its value was diminished by the frequent visits of ships, 40,000 barrels of oil are recorded to have been taken from there, in one season, by the fleets which annually frequent its waters.

The cost of outfit of a South Sea whaler from the port of London is from £8,000 to £12,000, and the time occupied from two years and a half to three years, sometimes unsuccessfully exceeded. On her return to the port of London, with a full cargo, she is worth £23,000; £3,000 for the ship and stores, and £20,000 for 250 tons of oil, at £80 per tun.*

THE CAPE WHALE (*Balæna Australis*, Desmoulins), *Right Whale* of the South Sea whalers, in commercial value is only second to the sperm whale. It so closely resembles the Greenland whale, that it was regarded as the same animal until the researches of modern anatomists (and chiefly those of the immortal Cuvier) detected sufficient differences to justify the opinion that they are distinct species, each peculiar to the polar region it inhabits.†

The right whale of the South seldom exceeds 50 feet, but has been known to attain 70

* One hundred and sixty tons is an average cargo. The largest quantity ever brought to this country, as one cargo, was 330 tons, by the *Rochester*, Capt. Smith, in 1830. The largest cargo of sperm oil ever taken to the United States is said to have been rather more than 500 tons.

† The right whale, so abundant, and so little molested in the northernmost waters of the Pacific (or off the N.W. coast of America), is probably identical with the Greenland species.

feet in length. Its colour is uniformly black, and one of average size produces eighty or ninety barrels of oil. It frequents the coasts of southern continents, as well as those parts where there is but little depth, and where vast congregations of medusæ and mollusks furnish its food. In the central parts of the Pacific it is not known.

The cape whale differs essentially from the sperm whale, and most other cetaceans, in the habit of repairing to shallow and sheltered waters to bring forth its young. Thus the western side of Cook's Strait, New Zealand, is called Motherly Bay from this circumstance.

The HUMPBACK WHALE (*Balæna Gibbosa*, Gmelin; *Balenoptera* species).—This whale (which is a rorqual), between 30 and 40 feet in length, derives its trivial name from an embossed appendage or hump on the posterior part of the back. It has two spiracles or nostrils on the summit of the head, and its mouth is furnished with plates of short whalebone.

When seen on the surface of the water it closely resembles the sperm whale in appearance and colour, and also in the habit of casting its tail vertically when about to dive. Experienced whalers, however, readily distinguish the two species by the spout, which, in the humpback, is less regular in its repetition, arises farther back on the head, and, ascending more perpendicularly, hangs longer in the air than that of the cachalot. It occurs in small herds in the Atlantic and Pacific, but not often far from the land. It is seldom molested by whalers, and never the chief object of their pursuit, although the oil it produces is superior to that obtained from the right whale, and but little inferior to sperm oil. Its flesh, when young, is delicate food.

BLACK-FISH (*Phocæna* species).—This whale averages 16 feet in length, and usually roams in very large troops. They appear to inhabit the greatest portion of the aqueous globe, and are frequently observed between lat. 50° N. and 35° S. They are sometimes taken by the sperm-whalers for oil for the ship's consumption; but their capture is sometimes attended with risk, as when harpooned they have been known to leap into the boat. One of average size produces from thirty to thirty-five gallons of dark oil, of an unpleasant smell.

RIGHT WHALE PORPOISE (*Delphinus Peronii Lacépède*), a rare and elegant species of dolphin; only once seen in the *Tuscan*, in her passage round Cape Horn. It has no dorsal fin or appendage, and hence the name given it by the whalers. Its average length is 6 feet. The upper part is of a deep black, terminating in an abrupt straight line, beneath which it is of a pure and dead white. Its flesh is delicate eating, and it congregates in large shoals.

THE COMMON DOLPHIN, or PORPOISE (*Delphinus Delphis*, Linn.), is apparently common in every sea, and is also met with in the Pacific.

The GRAMPUS is a name applied by South Sea whalers to a species of cetacean very common in the Pacific, from the equator to 44° N., 10° S. They occur in herds, and are supposed to indicate the resort of cachalots. Whether it is identical with the North Sea grampus is not known.

FIN-BACKS, COW-FISH, and KILLERS are cetaceans, known to the South Sea-men by their respective names. As they are accurate and shrewd observers, these names are usually expressive. But little is known of any of them. The killer is, as its name implies, the reputed destroyer of the other, and the largest kind of whales—in fact, the cannibal of its race. Whales thus designated appeared to the *Tuscan* in small bands, and chiefly in the vicinity of the equator. They are of moderate size, spout much like the cachalot, and are distinguished by a tall, erect dorsal fin, resembling in this respect the grampus.

BONE SHARKS.—While cruising in the Pacific, Mr. Bennett occasionally saw large animals greatly resembling whales, excepting that their tail fin was perpendicular, and they did not spout, swimming near the surface of the sea, apparently about 20 feet long, and called by the whalers bone sharks. They are said to have whalebone in the mouth, and, like the shark or other fish, can live under water for an indefinite time. Some whalers religiously avoid encountering them; they have sometimes been mistaken for whales: they are scarcely known; perhaps they may be allied to the Basking Shark (*Squalus Maximus*).

In concluding these brief extracts from the interesting volumes of Mr. Bennett, we do so with a recommendation, to all who feel interested in this subject, to read his work.

IV.—WHALING.

FROM CAPT. DU PETIT THOUARS' REPORT.

The whale fishery is divided into two distinct branches: the first owes its pre-eminence from the danger of following it, and the greater value of its produce; it is the most important. This fishery is that of the whale called by the French the *cachalot*, and by the English and Americans the sperm whale, or sometimes the white whale.

This whale produces the spermaceti. It is only caught in the open sea, and generally out of soundings, particularly between the tropics, or in special localities, according to the season.

The second branch is that of the right whale, or rather black whale, called by the French *Baleine Franche* (free whale).

These two species of whale fishing are not more different in the mode of carrying them on than in their products.

The sperm-whale fishery is specially followed by the Americans; these only take the right whale when their fishing is nearly over, and they have not a full cargo, and rather than return empty, they endeavour to obtain a cargo of the other. The reason for this is the difference in the respective value of the two products.

A full cargo of sperm-whale oil, in good years, in the United States, is worth from £40,000 to £48,000; the same cargo, the produce of the black whale, would not be worth more than £8,000 or £12,000.

The English, also, follow the sperm-whale fishing, but they do not entirely neglect it for the right whale. The greater number of their whalers are devoted to the sperm-whale, the minority to the right-whale fishing. Some pursue both. The second fishery is actively carried on in small vessels on the coasts of New Zealand, on that of Australia and Van Diemen's Land; these bring their cargoes to Sydney, Hobarton, and Launceston.

The French, up to the present period, have only followed the black-whale fishing; but some of them have taken the sperm where it has been met with among the right whales, which frequently occurs between lats. 35° and 45°, in the summer of either hemisphere.

Within the last few years, whether the sperm whale has not been so abundant, or the produce declined in value, several Americans have indiscriminately followed both sorts of fishing, with very good results.

The sperm whale remains almost constantly between the tropics; but, from the end of September to the beginning of April, they are often found in great numbers from the equator to lat. 40° S., between the coast of South America and the East coast of New Zealand; and from April to September, from the equator to 40° N., between Japan and the N.W. coast of America.

It is in the higher latitudes that the two species of whales are found together, particularly between lats. 30° and 36°. Nevertheless, the sperm whale is never found but in the open sea, out of soundings.

Besides the spaces outside the tropics, the sperm whales are found at all seasons within them. For a great number of years they were met with in abundance at the Galapagos Islands, chiefly to windward of this archipelago, and near the Redondo Rock; but they seem to have abandoned this space, as during a month that *La Venus* stood here they were but seldom seen.

The waters around the Sandwich Islands and the Marquesas are always considered good fishing grounds: it is the same in the neighbourhood of Japan, the Kurile Islands, those of Bonin, and the Kingsmill group.

In the space comprehended between lat. 5° and 10° S., and lon. 90° and 120° W., the

fishing is abundant throughout the year, but especially from November to February. This space is known to the whalers as the *Off-Shore Ground*.

Lastly, in the northern hemisphere, between lat. 30° and 35° , and lon. 150° and 160° W., there is a space which, in June to October, is usually very productive.

The black or right whale is found everywhere, but particularly near the land on the West coast of Patagonia, between the parallels of 35° and 45° S., in the summer of the hemisphere, and in the harbours of the coasts during the winter; on the West coast of America, at Chile, between 35° and 45° , from September till April; on that of California, from April to September, from 30° to 40° N.; on the East coast of New Zealand, from October to March, from 35° to 40° parallel, and on this coast throughout the year, wintering in the eastern ports, where they are less exposed to bad weather, and where the fishing can always be conducted with advantage.

Black whales are also found, in great numbers, on the eastern coast of Japan, during the summer, and chiefly from May till the end of August on the coasts of Australia and Van Diemen's Land, from lat. 35° to 45° , both to the East and West, from October till February.*

REMARKS BY COMMODORE WILKES, OF THE UNITED STATES' EXPLORING EXPEDITION.

Our whaling fleet now counts 675 vessels; the greater part of which are ships of 400 tons burden, amounting in all to 200,000 tons. The majority of these vessels cruise in the Pacific Ocean. Between 15,000 and 16,000 of our countrymen are required to man these vessels, half of whom go to sea for the first time as green hands, and return, after a voyage of fatigue and hazard, transformed into sailors.

The value of the whale fleet is estimated at no less than 25,000,000 dollars, yielding an annual return of 5,000,000, extracted from the ocean by hard toil, exposure, and danger. The estimated quantity of oil imported into the United States is about 400,000 barrels, nearly one-half of which is sperm oil.

There are two kinds of whales which are principally the object of search by our whalers. These are the sperm whale (*Macrocephalus*), and the right whale (*Mysticetus*). These two animals differ exceedingly, both in their form and in their habits. The first is furnished with teeth, the last with a collection of laminæ; they are therefore adapted to different kinds of food: the former feeds on the large medusæ of the ocean, termed by the whalers squid; the other on small crustacea and fish. Their feeding grounds are seldom in the same places; for while the latter frequents the coasts and bays, the former is seldom found except in the deep sea, and generally far from land.

Whales of the two different kinds are easily distinguished at a distance by the experienced from the volume of their spout; its direction and elevation, the number of times it is repeated, the manner in which they dive, the length of time they disappear, and the body they expose to view.

I shall now proceed to point out the cruising grounds, and explain the operations of the whalers, directing my attention first to the sperm-whale fishery, not only because it is the most valuable, but because it depends more upon the skill and information of those engaged in it.

The master of a whale-ship should be a good seaman and navigator, well acquainted with the winds and currents, as well as with the cruising ground of his prey. When he is thoroughly acquainted with these, and possesses a good ship, with a spirit of perseverance and energy, there is little fear of his returning home with a clean ship.

The principal whaling grounds in the Pacific are confined particularly to spaces which have been known in the Pacific Ocean under names well understood among the whalers, such as the "On-Shore Ground," the "Off-Shore Ground," the "Middle Ground," &c.

* Voyage autour du Monde, dans *La Venus*, 1841, tome iii. pp. 375—380.

These spaces, however, have wide limits; thus, for instance, the On-Shore Ground embraces the whole extent of ocean along the coasts of Chile and Peru, from the Island of Juan Fernandez to the Galapagos Islands; and the Off-Shore Ground, the space between lat. 5° and 10° S., lon. 9° and 120° W.

The following list embraces all the different grounds in the Pacific visited by our whalers.

1. The On-Shore Ground.
2. The Off-Shore Ground.
3. In the neighbourhood of the Hawaiian Islands.
4. In the neighbourhood of the Society Islands.
5. In the neighbourhood of the Samoan group.
6. In the neighbourhood of the Feejee group.
7. In the neighbourhood of the Kingsmill group.
8. Along and to the South of the equator, from the coast of South America, to the Kingsmill group.
9. Across the South Pacific, between the parallels 21° and 27° S.
10. Across the North Pacific, between the parallels 27° and 35° N.
11. In the neighbourhood of the East coast of New Zealand.
12. The Middle Ground, between New Holland and New Zealand.
13. The coast of Japan, and between it and the Bonin Islands.
14. The N.W. coast of America.
15. Coast of California.

These, it will seem, embrace a large field, and it might be supposed that a ship could hardly miss finding the animals. Such, however, is not the case. A vessel may visit all these places, and yet return home a clean ship, if she happened to be out of season. It appears from experience, that whales in their migrations congregate in the above-named places at certain times of the year, and those who are acquainted with the business endeavour to be early on the cruising grounds. I shall now point out the times, according to the best information, at which the whales visit the several grounds, and, although not a whaler, I hope to give such information as may be useful to this adventurous class of my countrymen. For convenience of description the cruising-grounds may be considered as included within four distinct sections or belts. These belts are from 20° to 25° degrees of latitude in width.

The first is that between the equator and the northern tropic; the second, between the tropic and lat. 50° N.; the third, between the equator and the southern tropic; and the fourth, between the southern tropic and lat. 50° S.

Within the tropics, whales are almost always to be met with. There are, however, particular places within this zone where they chiefly congregate. Whales are found in the first belt on the North side of the equator, to the southward of the Sandwich Islands, and thence westward as far as the Mulgrave Islands, for the greater part of the year; but the only spot or space they are known to abound, at any particular season within this belt, is to the westward of the Galapagos; they pass and repass over the rest of this space in their migrations, and may generally be found near to, or round, the small islands.

In the second belt, they range from the coast of Japan to the N.W. coast of America and California, this they frequent from May till November. In the month of July they are found off the Bonin Islands, and between them and the coast of Japan. They frequent the space lying to the northward of the Hawaiian Islands, and comprehended between the parallels of 28° and 35° N., and within the meridians of 145° and 165° W., from June to October; and resort to the N.W. coast of America in August and September, and to that of California in November and January.

The third belt comprises the ocean from the West coast of South America to the Kingsmill group, including the Marquesas, Society, and Friendly Islands, the Samoan and Feejee groups. Within these are the spaces known as the "On-Shore" and "Off-Shore"

Grounds. The latter the whalers frequent from November to February; and almost along this third belt they are found until the months of July and August, by which time they reach the Kingsmill and Feejee groups. There are, however, stragglers to be met with in this space during all seasons. The fourth belt extends from the southern tropic to the lat. of 50° S. The most profitable time for cruising within it is in the months of March, April, and May, to the eastward of New Zealand. After that date, along and between the parallels of 22° and 28° S., from the coast of New Holland to that of South America. The portion of the sea between New Holland and New Zealand is called the "Middle Ground," and is frequently found very profitable.

From an examination of the particular localities in which the whales are found most numerous at certain seasons, and connecting these with my own observations on currents, I am induced to believe the places of their resort will point more correctly to the neutral points, or spaces of no current, than any other data that we yet possess.

These must naturally become the rendezvous, or 'feeding places, of these animals. The determination of these points will, therefore, throw additional light on the system of currents in the ocean, by pointing out the neutral spaces. The chief resort of whales will be seen on the map at one view; and when these are connected with the currents shown to exist by the observations of the Expedition and others, they will be found to correspond, in a remarkable manner, with the neutral spaces.

I have myself paid much attention to acquiring information, in relation to the positions of these grounds, from the masters of the whale-ships, but have usually found their reports at variance one with another, and they have sometimes differed as much as 5° in assigning their limits. Their position, no doubt, varies much in different years; but even this will not explain all the discrepancies of the statements.

If we examine the seasons of the appearance of whales at certain islands, they will generally be found to be between the beginning and the end of the summer of the climate, during which time animal life is most prolific, and the food of the whale consequently abounds near the particular group. I have frequently been told, and it is generally believed, that whales are partial to warmth, and frequent few places outside the tropic. This, if true, would be singular enough; but the main reason for their frequenting the summer seas at particular seasons is the procurement of food, which is there to be found in greater abundance; and there appears to be little doubt that, in migrating, these animals move with the currents, until they find their food in plenty, and then continue in such locality until it is exhausted. A number of instances are known in which, at certain seasons, strong currents have been experienced in places where, three months afterwards, they were found to have ceased altogether, or even to have changed their direction. I have now particular reference to the N.W. coast.

There are two routes by which our whale-ships can enter the Pacific; one by the Cape of Good Hope, and round New Holland; the other by Cape Horn. To take the first route, they ought generally to time their departure so as to meet the season of New Zealand in March; this is the best course also for ships sailing in the autumn from the United States. They will reach their whaling ground at the earliest possible season, and place themselves at once in a position to reap the harvest of which they are in search; and they would, in all probability, have time to refit and recruit after the outward voyage. This is much more important for ensuring success than very many either of the masters or owners are aware. After a few days in port, and a supply of fresh vegetables, they would find both their ships and crews in a better condition to take the sea and keep it. After remaining six weeks or two months on the New Zealand Ground, until the winter season and boisterous weather approach, the vessels should pass to the northward, towards Sunday Island, and thence cruise to the eastward, between the latitude of 22° and 28° S., or even in a few degrees higher latitude. The lower latitudes are, however, found to be most frequented by the whale. Along these parallels they proceed as far as the coast of South America, so as to arrive there in the

course of the month of September, after passing part of the time to the westward of the Islands of Juan Fernandez and Mas-a-Fuera.

Other vessels reach the Society Islands in June, and thence pass to the westward, in order to meet the season of the Samoan and Feejee Groups; thence again, without the tropics, to the South, either on the Middle Ground between New Holland and New Zealand, or to a higher South latitude, and again meet the season of New Zealand at the end of summer or in March. Those that reach the coast of Chile generally recruit in the Bay of Talcahuana, or in the Port of Payta, in Peru, and are ready to take up the season on the Off-Shore Ground in November. Vessels leaving the United States in the beginning of summer would do better to take the route round Cape Horn, reaching Chile or Peru in time to recruit before the month of November, at which time they repair to the Off-Shore Ground, where they remain for one, two, or three months; thence pass to the Marquesas Islands and to the westward of them, and thence to the West, along the equator as far as the Mulgrave Islands to the coast of Japan. Returning, they proceed to the N.W. coast of America, California, and finally reach the Sandwich Islands to recruit by the months of October or November. Other vessels pass directly from the Off-Shore Ground to the neighbourhood of the Sandwich Islands, where they spend the months of February, March, and a part of April; they then proceed to lat. 30°, and continue their cruising on each side of that parallel, between the meridian of 145° and 165° W., until October, when they repair to the Hawaiian Islands to recruit.

It will be readily seen that there is ample room for a vast fleet to operate in these numerous and extensive spaces without the vessels interfering with each other, and many more might be advantageously employed. An opinion has, indeed, gained ground within a few years that the whales are diminishing in numbers; but this surmise, as far as I have learned from numerous inquiries, does not appear to be well founded. They have, indeed, become wilder, or, as some of the whalers express it, "more scary," and, in consequence, not so easy to capture; but if we consider the numbers that continue to be yearly taken, there will, I think, be no reason to suppose that any great decrease has occurred. On the average it requires fifty whales to fill a ship; and it would, therefore, take about 5,000 whales annually to supply the quantity of oil that is imported. This would appear but a small proportionate number, if these animals were as prolific as our herds on shore, when it is considered that they have a feeding of 20,000,000 of square miles.

The number of right whales captured is to the spermaceti in the proportion of about two to one. The former are principally found on the coasts, in the bays and even in the harbours, and are far more numerous than the sperm whale. They are pursued to the greatest advantage in small vessels. They frequent the coast of Chile during the summer season, from October to March, and are to be found on the N.W. coast of America and that of California during the northern summer, or from March to November. On both the East and West coast of New Holland, as well as that of New Zealand, they are abundant from September to March in the bays where they resort to calve. This, however, they no longer do without molestation, as the shores are now occupied by extensive establishments for taking them, well provided with boats. On the signal from the look-out the boats are launched, and soon in hot pursuit of the game, which, when killed, is towed into the bay and dragged on shore, where it is cut up and "tried out." There are few places which surpass these localities for the commission of all kinds of vice; in saying this I have reference as well to those of South and West Australia as to those of New Zealand, although the latter are the most noted for their enormities. Some merchants, it is said, in Sydney advance the capital, and share the profits of those who undertake the business. The latter generally engage in their service a large number of natives and some of the lowest whites, whom they allow to indulge in every sort of vice so long as they can make use of them. Quarrels often take place between the parties engaged in the same business, and the rivalry not unfrequently leads to sharp conflicts and bloodshed.

Such has been the indiscriminate manner in which the whales have been slaughtered, both old and young, that these haunts have, of late years, been less frequented by them.

The right whale is found of much larger size in high latitudes than in low, and not unfrequently yields, when taken in these latitudes, as much as 180 barrels of oil. Besides the oil, the whalebone produces some profit. A large number of these whales were seen by us in the bays about Cape Horn in the months of March and April; but the weather there is seldom favourable to the use of boats, and would preclude success in carrying on such a business.

On soundings, and in shoal water, attempts have been made to capture a different species of whale, called the hump-back (*gibbosa*); but there is a great impediment to the securing of the spoils of this game; for, when killed, they immediately sink for thirty or forty hours. It therefore becomes necessary to anchor a boat near by to watch, or leave a buoy, and then, not unfrequently, they may be swept off by the under current, or lost by bad weather.

Although the high latitudes offer great inducements, on account of the number and size of the whales, yet there are many difficulties existing, that render it preferable to pursue the game in the low latitudes. The weather, even in the summer season, is often tempestuous, which makes it dangerous to lower boats; and there are, even in the fine season, fogs, which not only tantalize but prevent the chase from being extended from the ship, without the risk of losing both boats and crew. I have been told that it has frequently happened that boats have been separated from the ship for several days; thus not only producing great anxiety, but often much distress from want of provisions and water. Our whalers feel that there is quite enough of adventure and peril in following their employment in the lower and less boisterous latitudes.

Notwithstanding these difficulties, the favourite and most successful ground for the right whale is between the 50th and 55th parallel of North latitude, where vast numbers have been recently taken in June and July, of great size; although the season is of short duration, yet large ships have obtained a full cargo before its close.

It is impossible to meet a whale-ship on the ocean without being struck by her mere appearance. The vessel, under short sail, with look-out at the mast-head, eagerly scanning the wide expanse around them, has totally a different air from those engaged in a regular voyage.

But admiration is excited on becoming a looker-on at the chase and capture. When the cry from aloft "There she spouts!" and the quick response of "Where away?" are heard, the bustle on the deck shows a state of animation that would scarcely be supposed among such a set of men. The boats are immediately put in requisition, lowered and manned, and, within a few minutes, the pursuit is begun. The boats dash on until the boat-steerer comes within sight of his object; the whale is soon reconnoitred, and endeavours are made to approach him unobserved, and plunge the harpoon as near the fin as possible; a wound near this place is sometimes fatal, and no further injury is necessary to secure the animal's capture. On being struck, the whale at once dives, carrying out the line (which is kept coiled up in tubs), with great velocity, through a notch in the stern of the boat. The velocity of the line is at times so great, that in order to prevent the boat from being set on fire by the friction water is applied. After the whale dives some fifteen or twenty minutes pass, during which time the "fast" boat is often carried a distance from the others; for the whale, in descending, generally takes an oblique course. The boat is so much buried in her rapid flight, that I have at times only been able to see the persons in her, for the water on each side was thrown so high as to conceal the hull from a distant observer, although the sea was otherwise quite smooth.

As the whale rises, a skilful boat-steerer will be ready at hand, and the moment the animal makes his appearance, lances are plunged in quick succession into his vital parts; when off he again bounds with the life-blood streaming from him, and shortly after this huge monster is seen to turn over lifeless on his back. The shortness of time that seems to

elapse from the first onset to the capture and death of so large an animal seems inconceivable; and the apparently insufficient means that are employed to accomplish it are likewise remarkable. The whale being slain, signal is made for the ship, if to windward, to come down, or if to leeward, the monster is taken in tow by the boats, and brought alongside, when the "fluke-hooks" and chains are used to secure him; the operation of baling out the head-matter then begins, which is followed by stripping off the blubber in large pieces called "blankets," from four to six feet wide, to which tackles are applied, to draw it up as it is separated from the carcass. After being taken on board the blankets are cut up. The next operation is "trying-out;" this is done by melting the blubber in a large pot, set in a fire-place of brickwork, which is carefully secured on the upper deck, with a trough around it, in which water is put to prevent accidents from fire. The fuel used is blubber from which the oil has been extracted, which produces a strong heat, and is a very economical fire. To prevent accidents great caution is necessary, and the readiest mode that has been found to extinguish burning oil is by throwing sand on it. A quantity of sand is therefore kept in the "try-works." In well-regulated ships, the oil, after baling, is put into reservoirs until it cools, after which it is drawn off and placed in the proper casks; of each of these a sample is kept, properly marked and labelled, and these are often shown with much pride by the master of the ship to his visitors, as indication of his success and the quality of his oil.

The profits of the whaling fishery have been great, and show what industry and perseverance can yield when well-directed. The small number of accidents in this large fleet is surprising; for the total losses, for which underwriters have to pay, seldom exceed one per cent., and those from other accidents are not more than one-half per cent. The insurance seldom exceeds two and a half per cent. by the year, and at this low premium the underwriters have derived good dividends.

Of late years there has been much fluctuation in the price of oil, which has caused those to make losing voyages who returned at the time of its depression; but, at the steady price of eighty-five cents. per gallon for sperm oil, and thirty-five cents. for whale oil, voyages would generally yield a handsome return.

It is estimated that about ten per cent. of the ships make losing voyages, as well from the incompetency of the masters as from accidents and ill-luck.

The greater proportion of the oil finds a market in Germany, Holland, and Prussia; consequently the prices abroad control those at home.

I have stated the number of sperm whales that are taken at 5,000; and this, in some years, may be beyond the truth. From the best authorities, the whole of both species annually taken is about 10,000, including those lost from accidents, and those cut adrift in consequence of bad weather or night. These losses may amount to eight or ten per cent. of those mortally wounded. It is said that an equal proportion of bull and cow whales are taken; it is, however, admitted that the latter are the most numerous; and the preferable reason for the equality in the number taken may be, that the bull whale, being the largest, is most sought after. The bull whales yield, on an average, from thirty to forty-five barrels, and, at times, no more than five barrels. Bull whales are never found together but in small numbers, while the cows are seen in large herds.

The right whale fisheries occupy the higher latitudes in both hemispheres, which are their feeding grounds. As the winter is setting in, the cows resort to the bays to bring forth their young, where they remain until the spring months, when they again resort to the feeding grounds, to meet the bulls. It is not known where the latter go during the interval, but it is generally supposed to the high latitudes, where they find their food in great plenty.*

* Narrative of the United States' Exploring Expedition, vol. v. pp. 484—502.

NOTICE TO WHALEMEN, BY LIEUTENANT M. F. MAURY, U.S.N.

Lieutenant Maury, whose labours in the generalizing of the observations on the winds and currents of the Atlantic are well known, has extended a somewhat similar process relative to the whaling of the Pacific; Capt. D. McKenzie of New Bedford, and George Manning of New York, having, under his superintendence, been engaged for a year in procuring information from whalers and others on the subject. The results have been placed on a chart (not yet published), divided into districts of 5° latitude by 5° longitude. In these the number of days of search, and the number of days in which whales have been seen, are recorded as occurring in that district.

From his report to the chief of the Bureau of Ordnance and Hydrography we extract the following:—The accompanying "Notice to Whalers," is derived from the investigations that have been carried on at this office with regard to the migratory habits and places of resort of the whale, sperm or right. From these I have reason to believe that the right whale of the southern hemisphere is quite a different animal to that of the northern; and that the two are separated by (to them) an impassable barrier. I have also reason to suspect, from results that have been elicited in the course of these investigations, that the same whale which is taken in Behring's Straits is taken in Baffin's Bay also; and, if this be so, these investigations prove beyond question that this animal cannot pass from one region to the other except through the Arctic Ocean; and hence we are entitled to infer that there is, at times, at least, an open water communication between these and the bay; in other words, that there is a N.W. passage. This interesting piece of circumstantial evidence in favour of a passage there was called to the notice of Lieutenant De Haven, when he left this office to take command of the expedition in search of Sir John Franklin and his companions. So much was that enterprising officer impressed with the importance of this suggestion, and the considerations growing out of it, that he expressed his intention, after reaching the Arctic Sea, to observe closely the habits of the whale, and should this fish take a westwardly course, to use them as pilots by the way. The wind and current charts give me reason to conjecture that the whalers who attempt to cruise in high southern latitudes will find it a region of heavy weather; for though our researches have not yet been extended to that quarter, the results attained with regard to the trade-winds indicate, that in the general system of atmospheric circulation the prevailing winds are less liable to interruption, and that the general system of circulation is more active in the southern than in the northern hemisphere; and, therefore, it may be suggested, by way of precaution, that none but staunch, well fitted and found vessels should undertake the high southern cruise.

Sperm Whaling Ground about the Equator.

Months.	Latitude.	Longitude.
	0° to 05° S.	80° to 75° W.
May to November (inclusive)	0 05	85 80
April to December	0 10	90 85
December to July	0 05	90 85
December to March	0 05	90 85
February	0 05	125 120
All the year	0 10	170 180
All the year	5 10	85 80
All the year	5 10	95 90
All the year	5 15	110 100
August to September (inclusive)	5 10	115 100
November to March	5 10	120 115
December to April	5 10	125 120
January to June	5 10	130 125
February to June	5 10	135 130

Months.	Latitude.		Longitude.	
January	5°	10° S.	145°	140° W.
December to January (inclusive)	5	10	155	150
March and May	5	10	160	155
December, January, March, June, and November	5	10	175	170
December, January, and February	10	20	80	75
July to November (inclusive)	10	15	85	80
July to February „	10	15	90	85
November to June „	15	20	85	80

North Pacific.

May, June, July	20	25	150	145 E.
May to August (inclusive)	20	25	170	105
April to October „	20	30	145	170
July to August „	25	30	140	145
June to October „	25	30	150	175

Right Whaling Ground, South Pacific.

January, February, March	20	50 S.	45	50 E.
May, June, July	25	30	35	40
September, October, November, December	30	40	55	80
October, November, December	30	40	60	65
October, November, December	30	40	65	80
December and January	35	45	90	95
July to November (inclusive)	35	40	115	120
November and December	45	50	120	130
January	45	50	160	170
December, January, February, March, April	40	50	170 E.	175 W.
September to May (inclusive)	30	45	85	75
August to December	20	40	175	165
November, December, January	30	50	165	150

North Pacific.

April and May	40	45 N.	145	150 E.
July to October (inclusive)	45	50	145	150
April and May	40	50	150	155
May to September (inclusive)	45	55	155	165
„ „	45	55	165	170
„ „	50	55	160 W.	165 W.
„ „	55	60	115	130

*South Atlantic.**

August to December (inclusive)	35	40 S.	25	20 W.
August to December „	35	40	20	05
September to December „	35	40	05 W.	10 E.

As to whether the right whales are to be found in the high northern latitudes in our winter, or in high southern latitudes in our summer, when the whalers do not visit such latitudes, of course the chart does not show. Thus, between 50° and 60° N., 130° and 155° W., we only know that whales are abundant from May to September, inclusive. We know not as to the other months, because the night and cold then drive the whalers from

* And in Behring's Straits.

this part of the ocean, and we cannot say anything as to the numbers in which the fish resort there then. The charts are, therefore, silent on the subject.

It is the same at the South in its seasons—that is, when it is winter there the whalers abandon the high latitudes, and seek their game in more genial climates.

But, seeing the abundance of our whales in the Greenland and Arctic Seas in our summer season, and seeing that they have not been sought for in similar latitudes South, I invite the attention of the whalers to the subject of southern whaling in South summer time.

Below the parallel of 50° S., indeed with here and there an exception, I might say that, below the parallel of 40° S. the whole chart is a blank; consequently few vessels go beyond that parallel. The indications to the chart are that somewhere to the South of these parallels, and between these meridians, as given below, whales are probably to be found in considerable numbers, if not in great quantities, viz:—

Below 40° S. from 25° W. to 10° E. <i>a.</i>			
„ 50 S.	45 E.	60 E.	<i>b.</i>
„ 45 S.	120 E.	140 E.	<i>c.*</i>
„ 50 S.	160 E.	120 W.	<i>d.</i>

In view of all the information before me, I would suggest the following as a very inviting route or cruise for a vessel that finds herself on the whaling ground of the South Atlantic in our fall months:—

She can cruise in the region *a*, of the last-mentioned table; and from that, but still keeping well down to the South, pass rapidly on, unless she finds whales by the way to the region *b*.

A week or two here will satisfy her as to the prospect for whales.

Entering the region *c*, more time might be spent in it, crossing different parallels, taking care to keep well to the South. After having cruised and tried sufficiently in region *c*, the favourite region, the vessel may then “crack on” for region *d*, and, when this region is explored, the season at the South will probably be over. The N.W. are the prevailing winds of these latitudes; and therefore the programme of this route would be easy.

Ending the search for right whales at the South, and leaving the region *d* for the equatorial cruising grounds, and entering them between 175° E. to 175° W. the route westward, and between 5° S. and 10° S., will be through the best sperm whale grounds. These grounds commence between the meridians of 180° and 170° W., after crossing the parallel of 35° S., for just here sperm whales resort in great numbers. Continue North between these meridians until you cross 10° S.

From 170° E. to 165° W., between the parallels of 5° and 10° S., is capital sperm ground.

The vessel, therefore, reaching these grounds between the meridians of 170° and 180° W., may tarry in them, tending westward, as long as she has luck, taking care not to look North of the line here for whales, for they are not to be found except as stragglers.

After crossing these grounds, which reach West as far as 170° E., and East to America, she should “carry on,” without stopping to look for whales, until she crosses 20° N., between 165° W. and 174° E., which is again fine sperm ground.

After passing West of 175° E. she will find good sperm ground between the parallels of 20° and 30° N., as far as 140° E.

Passing from these grounds, excellent right whale fishing will be found above the parallels of

50° N. between 135° W. and 165° W.			
45 N.	„ 155 E.	175 E.	
35 N.	„ 145 E.	155 E.	

* And in Behring's Straits.

and up through into Behring's Straits. Upon all these last-mentioned right whale grounds there is good fishing from May to September, inclusive.

I have not as yet found the log-book of any whaler that has cruised here at any other season of the year, and, therefore, my information as to the rest of the year is negative.

But there is reason afforded by the chart for the opinion that the right whales of the North Pacific never come to the South of the parallels named, and that, therefore, as a general rule, these fish remain somewhere to the North of the parallel of 35° all the year.

If this indication of the chart be correct, and I see no reason to question it, it appears that this animal must have supplies of food all the year round above 35° N.

I have reason to believe that the temperature of the sea has much to do with the whale, or the growth of its food; that the sperm whale delights in warm water, and the right whale in cold; and those whalers who are co-operating with me in collecting materials for the "Wind and Current Charts," and the whale chart belongs to the series, will, therefore, understand and appreciate the importance of keeping a daily record as to the *temperature of air and water*.

There is another point, also, to which I would call their attention, because, by regarding it, it may prove of value to these researches and to them, and that point is deep sea soundings.

It is said that the sperm whale goes to the bottom of the sea for its food. What is the greatest depth to which it can go for this purpose? and are its places of resort confined to parts of the ocean that come within these depths?

Now, if owners would provide their ships each with a few thousand fathoms of twine, and some scraps of old iron or lead to serve as sounding weights, I am sure that the whalers, from the great philosophical interest which many of them manifest with regard to my researches, would in calms get deep sea soundings for me.

If the ocean were very deep, and the time could not be spared to haul up the line, it might, the length out being known by what is left, be cut; and as the line and sinker would cost but little, the expense to each ship would be but a trifle.

I take this occasion to say, because some of the whalers have supposed it unnecessary to continue the abstract when in sight of land, that it is important to have a complete abstract for every day they are at sea, that we may know whether they find fish or not, how plentifully, the force and direction of winds and currents, temperature of the air and water, and glean information as to all other phenomena which they are requested in the abstract log to note.

V.—BICHE DE MAR, OR SEA SLUG.

The animal belongs to the genus *Holothuria*, and the prepared article finds a ready sale in the China market, where it is used as an ingredient in rich soups. Of the biche de mar there are several kinds, some of which are much superior in quality to the others: they are distinguishable both by shape and colour, but more particularly by the latter. One of the inferior kinds is slender, and of a dark brown colour, soft to the touch, and leaves a red stain on the hands; another is of a gray colour, and speckled; a third is large and dark yellow, with a rough skin and tubercles on its sides. The second kind is often eaten raw by the natives. The valuable sorts are six in number: one of a dark red colour; a second is black, from 2 inches to 9 inches in length, and its surface, when cured, resembles crape; a third kind is large, and of a dark gray colour, which, when cured, becomes a dirty white; the fourth resembles the third, except in colour, which is a dark brown; the fifth variety is of a dirty white colour, with tubercles on its sides, and retains its colour when cured; the sixth is red, prickly, and of a different shape and larger size than the others; when cured it becomes dark.

The most esteemed kinds are found on the reefs, in water from 1 to 2 fathoms in depth, where they are caught by diving. The inferior sorts are found on reefs which are dry, or nearly so, at low water, where they are picked up by the natives. The natives also fish the biche de mar on rocky coral bottoms, by the light of the moon or of torches; for the animals

keep themselves drawn up in holes in the sand or rocks by day, and come forth by night to feed, when they may be taken in great quantities. The motions of the animal resemble those of a caterpillar, and it feeds by suction, drawing in with its food much fine coral, and some small shells.

Capt. Eagleston stated, that the *biche de mar* is found in greatest abundance on reefs composed of a mixture of sand and coral. The animal is rare on the southern side of any of the islands, and the most lucrative fisheries are on the northern side, particularly on that of Vanua-Levu, between Anganga and Druau. In this place the most frequent kind is that which resembles crape. In some places the animal multiplies very fast, but there are others where, although ten years have elapsed since they were last fished, none are yet to be found.

The *biche de mar* requires a large building to dry it in. That erected by Capt. Eagleston, on the Island of Favea, is 85 feet long, about 15 or 20 feet wide, and nearly as much in height. The roof has a double pitch, falling, on each side of the ridge, to eaves which are about 5 feet from the ground. The roof is well thatched, and ought to be perfectly water-tight. There are usually three doors, one at each end, and one in the middle of one of the sides. Throughout the whole length of the building is a row of double-staging, called batters, on which reeds are laid.

On the construction of this staging much of the success of the business depends. It ought to be supported on firm posts, to which the string-pieces should be well secured by lashing. The lower batter is about 4 feet from the ground, and the upper from 2 to 3 feet above it. Their breadth is from 12 to 14 feet. Upon the large reeds with which the batters are covered is laid the "fish-fence," which is made by weaving or tying small cords together. This is composed of many pieces, the height of each of which is equal to the breadth of the batter.

A trench is dug under the whole length of the batters, in which a slow fire is kept up by natives, under the direction of one of the mates of the vessel. The earth from the trench is thrown against the sides of the house, which are at least 2 or 3 feet from the nearest batter, in order to prevent accident from fire. This is liable to occur, not only by carelessness, but from design on the part of the natives. As a further precaution, barrels filled with water are placed about 8 feet apart, along both sides of the batters.

After the house has been used for about a week, it becomes very liable to take fire, in consequence of the drying and breaking of the material used in the lashing. In this case it is hardly possible to save any part of the building or its contents. To prevent the falling of the stages by the breaking of the lashings, fresh pieces of cordage are always kept at hand to replace those that are charred, and show signs of becoming weak. A constant watch must be kept up night and day, and it requires about fifteen hands to do the ordinary work of a house.

The fires are usually extinguished once in twenty-four hours; and the time chosen for this purpose is at daylight. The fish are now removed from the lower to the upper batter, and a fresh supply introduced in their place. This operation, in consequence of the heat of the batter, is hard and laborious; and fifty or sixty natives are usually employed in it.

Firewood is, of course, an important article in this process, each picul of *biche de mar* requiring about half a cord to cure it. This fuel is purchased of the chiefs, who agree to furnish a certain quantity for a stipulated compensation. As much as twenty cords are sometimes bought for a single musket. In carrying on the drying it is important that the doors be kept shut while the fires are burning. Much also depends upon the location of the house, whose length should be at right angles to the course of the prevailing winds. The batters also should be nearest to the lee side of the house.

Before beginning the fishery, the service of some chief is secured, who undertakes to cause the house to be built, and sets his dependents at work to fish the *biche de mar*. The price is usually a whale's tooth for a hog'shead of the animals, just as they are taken on the

reef. It is also bought with muskets, powder, balls, vermilion, paint, axes, hatchets, beads, knives, scissors, chisels, plane-irons, gouges, fish-hooks, small glasses, flints, cotton cloths, chests, trunks, &c. Of beads, in assorted colours, the blue are preferred, and cotton cloth of the same colour is in most demand. For one musket a cask, containing from 130 to 160 gallons, has been filled ten times. When the animals are brought on shore, they are measured into bins, where they remain until the next day. These bins are formed by digging a trench in the ground, about two feet in depth, and working up the sides with cocoa-nut logs until they are large enough to contain forty or fifty hogsheads. If the fishery is successful two of these may be needed. Near the bins are placed the trade-house and trade-stand. In the first the articles with which the fish is purchased are kept, and in the second the officer in charge of them sits, attended by a trusty and watchful seaman. The stand is elevated, so that the persons in it may have an opportunity of seeing all that is taking place around them. All the fish are thrown into the bin before they are paid for.

In these bins the fish undergo the operations of draining and purging, or ejecting their entrails. These, in some of the species, resemble pills, in others look like worms, and are as long as the animals themselves.

The larger kinds are then cut along the belly for a length of three or four inches, which makes them cure more rapidly, but care must be taken to avoid cutting too deep, as this would cause the fish to spread open, which would diminish the value in the market.

When taken out of the bins and cut, the fish are thrown into the boilers, which are large pots, of which each establishment has five or six. These pots have the form of sugar boilers, with broad brims, and contain from 100 to 150 gallons. They are built in a row in rude walls of stone and mud, about two feet apart, and have sufficient space beneath them for a large fire. The workmen stand on the walls to fill and empty the pots, and have within reach a platform, on which the fish is put after it has been boiled. It requires two men to attend each pot, who relieve each other, so that the work may go on night and day. They are provided with skimmers and ladles, as well as fire-hooks, hoes, and shovels. No water is put into the pot, for the fish yield moisture enough to prevent burning. The boiling occupies from twenty-five to fifty minutes, and the fish remain about an hour on the platform to drain, after which it is taken to the house and laid to a depth of four inches upon the lower batter. Thence at the end of twenty-four hours it is removed, as has been stated, to the upper batter, where it is thoroughly dried in the course of three or four days. Before it is taken on board ship it is carefully picked, when the damp pieces are separated to return to the batter. It is stowed in bulk, and when fit for that purpose should be as hard and dry as chips. Great care must be taken to preserve it from moisture. In the process of drying it loses two-thirds both of its weight and bulk, and when cured resembles a smoked sausage. In this state it is sold by the picul, which brings from fifteen to twenty-five dollars.

Capt. Eagleston had collected, in the course of seven months, and at a trifling expense, a cargo of 1,200 piculs, worth about 25,000 dollars.

The outfit for such a voyage is small, but the risk incurred is of some moment, as no insurance can be effected on vessels bound to the Feejee group, and it requires no small activity and enterprise to conduct this trade. A thorough knowledge of the native character is essential to success, and it requires all possible vigilance on the part of the captain of the vessel to prevent surprise, and the greatest caution to avoid difficulties. Even with the exercise of these qualities he may often find himself and his crew in perilous positions.

In order to lessen the danger as much as possible, no large canoes are ever allowed to remain alongside the vessel, and a chief of high rank is generally kept on board as a hostage. When these precautions have not been taken accidents have frequently happened.*
—(Wilkes's Narrative of the United States' Exploring Expedition, vol. iii. pp. 218—223.)

* In order to show the profits which arise from the trade in biche de mer, I give the cost and

VI.—ON CORAL REEFS.

BY CHARLES DARWIN, ESQ., F.R.S., &c.

An interesting paper on the coral reefs is given in the Geological Report of the United States' Exploring Expedition, by James D. Dana, Esq., the naturalist to the Expedition. It is also copied into the American Journal of Science (Silliman's) for May and July, 1851. In this treatise the numerous features of these singular structures are alluded to with great clearness, but it will be exceeding our space to give them here. The elaborate and standard work of Charles Darwin, Esq., on the same subject, embodies all that can be useful to the sailor, and we prefer giving this here, and for the purpose of brevity extract that gentleman's own remarks as given in the second edition of his valuable work.

Mr. Darwin says:—I will now give a very brief account of the three great classes of coral reefs: namely, Atolls, Barrier, and Fringing reefs, and will explain my views on their formation. Almost every voyager who has crossed the Pacific has expressed his unbounded astonishment at the lagoon islands, or as I shall for the future call them by their Indian name of Atolls, and has attempted some explanation. Even as long ago as the year 1605, Pyrard de Laval well exclaimed, "*C'est une merueille de voir chacun de ces atollons, enuironné d'un grand banc de pierre tout autour, n'y ayant point d'artifice humain.*" The sketch of Whit Sunday Island in the Pacific, in Capt. Beechey's admirable voyage, gives but a faint idea of the singular aspect of an atoll: it is one of the smallest size, and has its narrow islets united together in a ring. The immensity of the ocean, the fury of the breakers, contrasted with the lowness of the land and the smoothness of the bright green water within the lagoon, can hardly be imagined without having been seen.

The earlier voyagers fancied that the coral building animals instinctively built up their great circles to afford themselves protection in the inner parts; but so far is this from the truth, that those massive kinds, to whose growth on the exposed outer shores the very existence of the reef depends, cannot live within the lagoon, where other delicately branching kinds flourish. Moreover, on this view, many species of distinct genera and families are supposed to combine for one end; and of such a combination, not a single instance can be found in the whole nature. The theory that has been most generally received is, that atolls are based on submarine craters; but when we consider the form and size of some, the number, proximity, and relative positions of others, this idea loses its plausible character: thus, Suadiva atoll is 44 geographical miles in diameter in one line, by 34 miles in another line; Rimsky is 54 by 20 miles across, and it has a strangely sinuous margin; Bow atoll is 30 miles long, and on an average only 6 miles in width; Menchicoff atoll consists of three atolls united or tied together. This theory, moreover, is totally inapplicable to the northern Maldiva atolls in the Indian Ocean (one of which is 88 miles in length, and between 10 and 20 miles in breadth), for they are not bounded, like ordinary atolls, by narrow reefs, but by a vast number of separate little atolls, other little atolls rising out of the great central lagoon like spaces. A third and better theory was advanced by Chamisso, who thought that the corals growing more vigorously where exposed to the open sea, as undoubtedly is the case, the outer edges would grow up from the general foundation before any other part, and that this would account for the ring or cup-shaped structure. But we shall immediately see

return of five cargoes, obtained by Capt. Eagleston in the Feejee group. These he obligingly favoured me with.

	Piculs.	Cost of Outfit.	Sales.
First voyage	617	1,101 dollars	8,021 dollars
Second voyage	700	1,200 "	17,500
Third voyage	1,080	3,396 "	15,120
Fourth voyage	840	1,200 "	12,000
Fifth voyage	1,200	3,600 "	27,000

A further profit also arises from the investments of the proceeds in Canton. Capt. Eagleston also obtained 4,488 lbs. of tortoise-shell, at a cost of 5,700 dollars, which sold in the United States for 29,060 dollars net.

that in this, as well as in the crater theory, a most important consideration has been overlooked, namely, on what have the reef building corals, which cannot live at a great depth, based their massive structures.

Numerous soundings were carefully taken by Capt. FitzRoy on the steep outside of Keeling atoll, and it was found that within 10 fathoms the prepared tallow at the bottom of the lead invariably came up marked with the impression of living corals, but as perfectly clean as if it had dropped on a carpet of turf; as the depth increased the impression became less numerous, but the adhering particles of sand more and more numerous, until at last it was evident that the bottom consisted of a smooth sandy layer; to carry on the analogy of the turf, the blades of grass grew thinner and thinner, till at last the soil was so sterile that nothing sprang from it. From these observations, confirmed by many others, it may be safely inferred that the utmost depth at which the corals can construct reefs is between 20 and 30 fathoms. Now there are enormous areas in the Pacific and Indian Oceans, in which every single island is of coral formation, and is raised only to that height to which the waves can throw up fragments, and the winds pile up sand. Thus the Radack group of atolls is an irregular square 520 miles long by 240 miles broad; the Low Archipelago is elliptic formed, 840 miles in its longer and 420 miles in its shorter axis: there are other small groups and single low islands between these two archipelagos, making a linear space of ocean actually more than 4,000 miles in length, in which not one single island rises above the specified height. Again, in the Indian Ocean there is a space of ocean 1,600 miles in length, including three archipelagos, in which every island is low and of coral formation. From the fact of the reef-building corals not living at great depths, it is absolutely certain that throughout these vast areas, wherever there is now an atoll, a foundation must have originally existed within a depth of from 20 to 30 fathoms from the surface. It is improbable in the highest degree that broad, lofty, isolated, steep-sided banks of sediment, arranged in groups and lines hundreds of leagues in length, could have been deposited in the central and profoundest parts of the Pacific and Indian Oceans at an immense distance from any continent, and where the water is quite limpid. It is equally improbable that the elevatory forces should have uplifted, throughout the above vast areas, innumerable great rocky banks within 20 to 30 fathoms, or 120 to 180 feet of the surface of the sea, and not one single point above that level; for where, on the whole face of the globe, can we find a single chain of mountain, even a few hundred miles in length, with their many summits rising within a few feet of a given level, and not one pinnacle above it? If, then, the foundations, whence the atoll-building corals spring, were not formed of sediment, and if they were not lifted up to the required level, they must of necessity have subsided into it; and this at once solves the difficulty. For as mountain after mountain, and island after island, slowly sank beneath the water, fresh bases would be successively afforded for the growth of the corals. It is impossible here to enter into all the necessary details, but I venture to defy any one to explain in any other manner how it is possible that numerous islands should be distributed throughout vast areas, all the islands being low, all being built of coral, absolutely requiring a foundation within a limited depth from the surface.

Before explaining how atoll reefs acquire their perpendicular structure, we must turn to the second great class, namely, Barrier reefs. These either extend in straight lines in front of the shores of a continent or of a large island, or they encircle smaller islands; in both cases being separated from the land by a broad and rather deep channel of water, analogous to the lagoon within an atoll. It is remarkable how little attention has been paid to encircling barrier reefs, yet they are truly wonderful structures. The sketch represents part of the barrier encircling the Island of Bola-Bola in the Pacific, as seen from one of the centre peaks. In this instance the whole line of reef has been converted into land; but usually a snow-white line of great breakers, with only here and there a single low islet crowned with cocoa-nut trees, divides the dark heaving waters of the ocean from the light green expanse of the lagoon channel. And the quiet waters of this channel generally bathe a fringe of low

alluvial soil loaded with the most beautiful productions of the tropics, and lying at the foot of the wild, abrupt, central mountains. Encircling barrier reefs are of all sizes, from 3 miles to no less than 44 miles in diameter; that which fronts one side, and encircles both ends of New Caledonia, is 400 miles long. Each reef includes one, two, or several rocky islands of various heights; and in one instance even as many as twelve separate islands. The reef runs at a greater or less distance from the included land in the Society Archipelago, generally from 1 to 3 or 4 miles; but at Hogoleu the reef is 20 miles on the southern side and 14 miles on the opposite or northern side from the included island. The depth within the lagoon channel also varies much; from 10 to 13 fathoms may be taken as an average; but at Vanikoro there are spaces no less than 56 fathoms or 336 feet deep. Internally the reef either slopes gently into the lagoon channel or ends in a perpendicular wall sometimes between 200 and 300 feet under water in height; externally the reef rises, like an atoll, with extreme abruptness out of the profound depths of the ocean. What can be more singular than these structures? We see an island, which may be compared to a castle situated on the summit of a lofty submarine mountain, protected by a great wall of coral rock, always steep externally and sometimes internally, with a broad level summit, here and there breached by narrow gateways, through which the largest ship can enter the wide and deep encircling moat.

As far as the actual reef of coral is concerned there is not the smallest difference in general size and outline, grouping, and even in quite trifling details of structure, in a barrier and an atoll. The geographer Balbi has well remarked that an encircled island is an atoll, with high land rising out of its lagoon; remove the land and a perfect atoll is left.

But what has caused these reefs to spring up at such great distances from the shores of the included islands? It cannot be that the corals will not grow close to the land; for the shores within the lagoon channel, when not surrounded by alluvial soil, are often fringed by living reefs; and we shall presently see that there is a whole class, which I have called *Fringing reefs*, from their close attachment to the shores both of continents and of islands. Again, on what have the reef-building corals, which cannot live at great depths, based their encircling structures? This is a great apparent difficulty, analogous to that in the case of atolls, which has generally been overlooked. It will be perceived more clearly by inspecting the following sections, which are real ones, taken in North and South lines through the island, with their barrier reefs of Vanikoro, Gambier, and Maurua; and they are laid down both vertically and horizontally, on the same scale of a quarter of an inch to a mile.

It should be observed that the sections might have been taken in any direction through these islands, or through many other encircled islands, and the general features would have been the same. Now, bearing in mind that reef-building corals cannot live at a greater depth than from 20 to 30 fathoms, and that the scale is so small that the plummets on the land show a depth of 200 fathoms, on what are these barrier reefs based? Are we to suppose that each island is surrounded by a collar-like submarine ledge of rock, or by a great bank of sediment ending abruptly where the reef ends? If the sea had formerly eaten deeply into the islands before they were protected by the reefs, thus having left a shallow ledge round them under water, the present shores would have invariably been bounded by great precipices; but this is very rarely the case. Moreover, on this notion, it is not possible to explain why the corals should have sprung up, like a wall, from the extreme outer margin of the ledge, often leaving a broad space of water within, too deep for the growth of corals. The accumulation of a wide bank of sediment all around these islands, and generally widest where the included islands are smallest, is highly improbable, considering their exposed positions in the central and deepest parts of the ocean. In the case of the barrier reef of New Caledonia, which extends for 150 miles beyond the northern point of the islands, in the same straight line with which it fronts the West coast, it is hardly possible to believe that a bank of sediment could thus have been straitly deposited in front of a lofty island and so far beyond its termination in the open sea. Finally, if we

look to the other oceanic islands of about the same height and of similar geological constitution, but not encircled by coral reefs, we may in vain search for so trifling a circumambient depth as 30 fathoms, except quite near to their shores; for usually land that rises abruptly out of water, as do most of the encircled and non-encircled oceanic islands, plunges abruptly under it. On what then, I repeat, are these barrier reefs based? Why, with their wide and deep moat-like channels, do they stand so far from the included land? We shall soon see how these difficulties disappear.

We come now to a third class of fringing reefs, which will require a very short notice. Where the land slopes abruptly under water, these reefs are only a few yards in width, forming a mere ribbon or fringe round the shores; where the land slopes gently under the water, the reef extends further, sometimes as much as a mile from the land; but in such cases the soundings outside the reef always show that the submarine prolongation of the land is gently inclined. In fact, the reefs extend only to that distance from the shore at which a foundation within the requisite depth, from 20 to 30 fathoms, is found. As far as the actual reef is concerned, there is no essential difference between it and that forming a barrier or an atoll; it is, however, generally of a less width, and consequently few islets have been formed on it. From the corals growing more vigorously on the outside, and from the noxious effect of the sediment washed inwards, the outward edge of the reef is the highest part, and between it and the land there is generally a shallow sandy channel a few feet in depth. Where banks of sediment have accumulated near to the surface, as in parts of the West Indies, they sometimes become fringed with corals, and hence in some degree resemble lagoon islands or atolls; in the same manner as fringing reefs, surrounding gently sloping islands, in some degree resemble barrier reefs.

No theory on the formation of coral reefs can be considered satisfactory which does not include the three great classes. We have seen that we are driven to believe in the subsidence of those vast areas, interspersed with low islands, of which not one rises above the height to which the wind and waves can throw up matter, and yet constructed by animals requiring a foundation, and that foundation to lie at no great depth. Let us, then, take an island surrounded by fringing reefs, which offer no difficulty in their structure, and let this island with its reef slowly subside. Now, as the island sinks down, either a few feet at a time or quite insensibly, we may safely infer, from what is known of the conditions favourable to the growth of coral, that the living masses, bathed by the surf on the margin of the reef, will soon regain the surface. The water, however, will encroach a little by little on the shore, the island becoming lower and smaller, and the space between the inner edge of the reef and the beach proportionably broader. Coral islets are supposed to have been formed on the reef; and a ship is anchored in the lagoon channel. This channel will be more or less deep, according to the rate of subsidence, to the amount of sediment accumulated in it, and to the growth of the delicately branch corals which can live there. We can now see why encircling barrier reefs stand so far from the shores which they front. We can also perceive that a line drawn perpendicularly down from the outer edge of the new reef to the foundation of solid rock beneath the old fringing reef will exceed, by as many feet as there have been feet of subsidence, that small limit of depth at which the effective corals can live; the little architects have built up their great wall-like mass, as the whole sank down, upon a basis formed of other corals and their consolidated fragments. Thus the difficulty on this head, which appeared so great, disappears.

If instead of an island we had taken the shore of a continent fringed with reefs, and have imagined it to have subsided, a great strait barrier, like that of Australia or New Caledonia, separated from the land by a wide and deep channel, would evidently have been the result.

Let us take our new encircling barrier reef, of which the section is now represented by unbroken lines, and which, as I have said, is a real section through Bola-Bola, and let it go on subsiding. As the barrier reef slowly sinks down the corals will go on vigorously

growing upwards; but as the island sinks the water will gain inch by inch on the shore, the separate mountains first forming separate islands with one great reef, and finally the last and highest pinnacle disappearing. The instant this takes place a perfect atoll is formed: I have said, remove the high land from within an encircling barrier reef and an atoll is left, and the land has been removed. We can now perceive how it comes that atolls, having sprung from encircling barrier reefs, resemble them in general size, form in the manner in which they are grouped together, and in their arrangement in single or double lines; for they may be called rude outline charts of the sunken island over which they stand. We can further see how it arises that the atolls in the Pacific and Indian Oceans extend in lines parallel to the prevailing strike of the high island and great coast lines of those oceans. I venture, therefore, to affirm, that on the theory of the upward growth of the corals during the sinking of the land, all the leading features in those wonderful structures, the lagoon islands or atolls, which have so long excited the attention of voyagers, as well as in the no less wonderful barrier reefs, whether encircling small islands or stretching for hundreds of miles along the shores of a continent, are simply explained.

It may be asked, whether I can afford any direct evidence of the subsidence of barrier reefs or atolls; but it must be borne in mind how difficult it must ever be to detect a movement, the tendency of which is to hide under water the part affected. Nevertheless, at Keeling atoll I observed on all sides of the lagoon old cocoa-nut trees undermined and falling; and in one place the foundation-post of a shed, which the inhabitants asserted had stood seven years before just above high-water mark, but now was daily washed by every tide; on inquiry I found that three earthquakes, one of them severe, had been felt here during the last ten years. At Vanikoro, the lagoon channel is remarkable; few islets have been formed by the heaping of fragments and sand on the wall like barrier reefs: these facts, and some analogous ones, led me to believe that this island must lately have subsided, and the reef grown upwards; here again earthquakes are frequent and very severe. In the Society Archipelago, on the other hand, where the lagoon channels are almost choked up, where much low alluvial land has accumulated, and where, in some cases, long islets have been formed on the barrier reefs, facts all showing that the islands have not very lately subsided, only feeble shocks are most rarely felt. In these coral formations, where the land and water seem struggling for mastery, it must be ever difficult to decide between the effects of a change in the set of the tides, and of a slight subsidence: that many of these reefs and atolls are subject to changes of some kind is certain; on some atolls the islets appear to have increased greatly within a late period; on others they have been partially or wholly washed away. The inhabitants of parts of the Maldiva Archipelago know the date of the first formation of some islets; in other parts the corals are now flourishing on water-washed reefs, where holes made for graves attest the former existence of inhabited land. It is difficult to believe in frequent changes in the tidal currents of open ocean; whereas we have in earthquakes, recorded by the natives on some atolls, plain evidence of changes and disturbances in progress in the subterranean regions.

It is evident, on our theory, that coasts merely fringed by reefs cannot have subsided to any perceptible amount; and, therefore, they must, since the growth of their corals, either have remained stationary or have been upheaved. Now, it is remarkable how generally it can be shown, by the presence of upraised organic remains, that the fringed islands have been elevated; and so far this is indirect evidence in favour of our theory. I was particularly struck with this fact, when I found, to my surprise, that the description given by MM. Quoy and Gaimard were applicable, not to reefs in general as implied by them, but only to those of the fringing class; my surprise, however, ceased, when I afterwards found that, by a strange chance, all the several islands visited by these eminent naturalists could be shown, by their own statements, to have been elevated within a recent geological era.

Not only the grand features in the structure of barrier reefs and of atolls, and of their likeness to each other in form, size, and other characters, are explained on the theory of

subsidence, which theory we are independently forced to admit in the very areas in question, from the necessity of finding bases for the corals within the requisite depth, but many details in structure and exceptional cases can thus also be simply explained. I will give only a few instances. In barrier reefs it has long been remarked with surprise, that the passages through the reef exactly face valleys in the included land, even in cases where the reef is separated from the land by a lagoon channel so wide and so much deeper than the passage itself, that it seems hardly possible that the very small quantity of water or sediment brought down could injure the corals on the reef. Now every reef of the fringing class is breached by a narrow gateway in front of the smallest rivulet, even if dry during the greater part of the year; for the mud, sand, or gravel, occasionally washed down kills the corals on which it is deposited. Consequently, when an island thus fringed subsides, though most of the narrow gateways will probably become closed by the outward and upward growth of the corals, yet any that are not closed (and some must always be kept open by the sediment and impure water flowing out of the lagoon channel) will still continue to front exactly the upper parts of those valleys, at the mouths of which the original basal fringing reef was breached.

We can easily see how an island, fronted only on one side, or on one side with one end or both ends encircled by barrier reefs, might, after long-continued subsidence, be converted either into a single wall-like reef, or into an atoll, with a great straight spur projecting, or into two or three atolls tied together by straight reefs, all of which exceptional cases actually occur. As the reef-building corals require food, are preyed upon by other animals, are killed by sediment, cannot adhere to a loose bottom, and may easily be carried down to a depth whence they cannot spring up again, we need feel no surprise at the reefs both of atolls and barriers being imperfect. The great barrier of New Caledonia is thus imperfect and broken in many parts; hence, after long subsidence, this great reef would not produce one great atoll 400 miles in length, but a chain or archipelago of atolls, of very nearly the same dimensions with those in the Maldiva Archipelago. Moreover, in an atoll once breached on opposite sides, from the likelihood of the oceanic and tidal currents passing straight through the breaches, it is extremely improbable that the corals, especially during continued subsidence, would ever be able again to unite the rim; if they did not, as the whole sank downwards, one atoll would be divided into two or more. In the Maldiva Archipelago there are distinct atolls so related to each other in position, and separated by channels either unfathomable or very deep (the channel between Ross and Ari atolls is 150 fathoms, and that between the North and South Nillandoo atolls is 200 fathoms in depth), that it is impossible to look at a map of them without believing that they were once more intimately related. And in this same archipelago, Mahlos Mahdoo atoll is divided by a bifurcating channel, from 100 to 200 fathoms in depth, in such a manner that it is scarcely possible to say whether it ought strictly to be called three separate atolls, or one great atoll not yet finally divided. I will not enter on many more details; but I must remark that the curious structure of the northern Maldiva atolls receives (taking into consideration the free entrance of the sea through their broken margins) a simple explanation in the upward and outward growth of the corals, originally based both on small detached reefs in their lagoons, such as occur in common atolls, and on broken portions of the linear marginal reef, such as bounds every atoll of the ordinary form. I cannot refrain from once again remarking on the singularity of these complex structures. A great, sandy, and generally concave disk rises abruptly from the unfathomable ocean, with its central expanse studded, and its edge symmetrically bordered, with oval basins of coral rock just lipping the surface of the sea, sometimes clothed with vegetation, and each containing a lake of clear water. One more point in detail: as in two neighbouring archipelagoes corals flourish in one and not in the other, and as so many conditions before enumerated must affect their existence, it would be an inexplicable fact if, during the changes to which earth, air, and water, are subjected, the reef-building corals were to keep alive for perpetuity on any spot or area.

And as, by our theory, the areas including atolls and barrier reefs are subsiding, we ought occasionally to find reefs both dead and submerged. In all reefs, owing to the sediment being washed out of the lagoon channel to leeward, that side is least favourable to the long-continued vigorous growth of the corals; hence dead portions of reef not unfrequently occur on the leeward side; and these, though still retaining their proper wall-like form, are now, in several instances, sunk several fathoms beneath the surface. The Chagos group appears from some cause, possibly from the subsidence having been too rapid, at present to be much less favourably circumstanced for the growth of reefs than formerly; one atoll has a portion of its marginal reef, 9 miles in length, dead and submerged; a second has only a few quite small living points which rise to the surface; a third and fourth are entirely dead and submerged; a fifth is a mere wreck, with its structure almost obliterated. It is remarkable in all these cases the dead reefs and portions of reef lie at nearly the same depths, namely, from 6 to 8 fathoms beneath the surface, as if they had been carried down by one uniform movement. One of these "half-drowned atolls," so called by Capt. Moresby to whom I am indebted for much invaluable information, is of vast size, namely, 90 nautical miles across in one direction, and 70 in another line, and is, in many respects, eminently curious. As by our theory it follows that new atolls will generally be formed in each new area of subsidence, two weighty objections might have been raised, namely, that atolls must be increasing indefinitely in number; and secondly, that in old areas of subsidence each separate atoll must be increasing indefinitely in thickness, if proofs of their occasional destruction could not have been adduced. Thus have we traced the history of these great rings of coral rock from their first origin, through their normal changes, and through the occasional accidents of their existence, to their death and final obliteration.

In my volume on coral formations I have published a map in which I have coloured all the atolls dark blue, the barriers pale blue, and the fringing reefs red. These latter reefs have formed while the land has been stationary, or, as appears from the frequent presence of upraised organic remains, whilst it has been slowly rising: atolls and barrier reefs, on the other hand, have grown up during the directly opposite movement of subsidence, which movement must have been very gradual, and, in the case of atolls, so vast in amount as to have buried every mountain summit over wide ocean spaces. Now in this map we see that the reefs tinted pale and dark blue, which have been produced by the same order of movement, as a general rule manifestly stand near each other. Again, we see that the areas with the two blue tints are of wide extent, and that they lie separate from extensive lines of coast coloured red; both of which circumstances might naturally have been inferred on the theory of the nature of the reefs having been governed by the nature of the earth's movement. It deserves notice, that in more than one instance, where single red and blue circles approach near each other, I can show that there have been oscillations of level; for in such cases the red or fringed circles consist of atolls, originally, by our theory, formed during subsidence, but subsequently upheaved; and, on the other hand, some of the pale blue or encircled islands are composed of coral rock, which must have been uplifted to its present height before the subsidence took place, during which the existing barrier reefs grew upwards.

Authors have noticed with surprise, that although atolls are the commonest coral structures throughout some enormous oceanic tracts, they are entirely absent in other seas; as in the West Indies, and parts of the East Indies, these tracts are known to have been rising within a recent period. The larger areas, coloured red and blue, are all elongated; and between the two colours there is a degree of rude alternation, as if the rising of one had balanced the sinking of the other. Taking into consideration the proofs of recent elevation, both on the fringed coasts and some others (for instance, in South America), where there are no reefs, we are led to believe that the great continents are, for the most part, rising areas; and from the nature of the coral reefs that the central parts of the great oceans are

sinking areas. The East Indian Archipelago, the most broken land in the world, is, in most parts, an area of elevation, but surrounded and penetrated, probably in more lines than one, by narrow areas of subsidence.

I have marked with vermillion spots all the many known active volcanoes within the limits of this same map. Their entire absence from every one of the great subsiding areas, coloured either pale or dark blue, is most striking; and not less so is the coincidence of the chief volcano chains with the parts coloured red, which we are led to conclude have either long remained stationary, or, more generally, have been recently upraised. Although a few of the vermillion spots occur within no great distance of single circles tinted with blue, yet not one single volcano is situated within several hundred miles of an archipelago, or even small group of atolls. It is the Friendly Archipelago which consists of a group of atolls upheaved and since worn partially down; two volcanoes, and perhaps more, are historically known to have been in action. On the other hand, although most of the islands in the Pacific, which are encircled by barrier reefs, are of volcanic origin, often with the remnants of craters still distinguishable, not one of them is known to have been in eruption. Hence, in these cases it would appear that volcanoes burst into action and become extinguished on the same spots, accordingly as elevatory or subsiding movements prevail there. Numberless facts could be adduced to prove that upraised organic remains are common wherever there are active volcanoes; but until it could be shown that in areas of subsidence volcanoes are either absent or inactive, the inference, probable in itself, that their distribution depended on the rising or falling of the earth's surface, would have been hazardous. But now I think we may freely admit this important deduction.

Taking a final view of the map, and bearing in mind the statements made with respect to the upraised organic remains, we must feel astonished at the vastness of the areas which have suffered changes in level, either downwards or upwards, with a period not geologically remote. It would appear also, that the elevatory and subsiding movements follow nearly the same laws. Throughout the spaces interspersed with atolls, where not a single peak of high land has been left above the level of the sea, the sinking must have been immense in amount. The sinking, moreover, whether continuous or recurrent with intervals sufficiently long for the corals again to bring up their living edifices to the surface, must necessarily have been extremely slow. This conclusion is probably the most important one which can be adduced from the study of coral formations; and it is one which it is difficult to imagine how otherwise could ever have been arrived at. Nor can I quite pass over the probability of the former existence of large archipelagoes of lofty islands, where now only rings of coral rock scarcely break the open expanse of the sea, throwing some light on the distribution of the inhabitants of the other high islands, now left standing so immensely remote from each other in the midst of the great oceans. The reef-constructing corals have been, indeed, reared and preserved as wonderful memorials of the subterranean oscillations of level; we see in each barrier reef a proof that the land has there subsided, and in each atoll a monument over an island now lost. We may thus, like unto a geologist who had lived his 10,000 years, and kept a record of the passing changes, gain some insight into the great system by which the surface of this globe has been broken up, and land and water interchanged.

VII.—ICE WATER.

A remarkable property of ice, in a pure state, that is, *transparent* and clear, has been recently shown by the aid of chemistry. The eminent professor, Dr. Faraday, in some late demonstrations, has clearly shown that transparent and pellucid ice is one of the purest substances in nature. It is scarcely possible, by the aid of chemistry, to separate any foreign admixture from water so perfectly as by the act of freezing it. No test, however delicately applied, can detect the presence of anything in the water procured by the melting of such ice. It neither contains air nor any trace of solution which the water forming it

might have contained. Thus matter, however poisonous, deleterious, or in great or minute quantities, becomes so absolutely removed from the ice, that it could never be ascertained to have existed in it.

Of course this can only apply to transparent ice, free from cavities in its substances, which cavities without certain circumstances will contain the separated portions of the solution.

This fact would be of great importance to the sailor in high latitudes, where water may be so readily procured from this source at every point. If the blocks of clear ice be washed in pure water, and contain no cavities, or these should also be washed in pure water, the dissolving of such ice will afford water purer than can be had from any source; and all deleterious admixtures, however great, in the solution from which it may be found, will be entirely removed, and may be assumed to be so with confidence.—ED.

VIII.—RUSSIAN AMERICA.

Convention between His Majesty and the Emperor of Russia, respecting the free navigation, commerce, and fisheries in the Pacific Ocean, and the limits on the N.W. coast of America. Signed at St. Petersburg, February 28, 1825.

Art. I. It is agreed that the respective subjects of the high contracting parties shall not be troubled or molested in any part of the ocean commonly called the Pacific Ocean, either in navigating the same, in fishing therein, or in landing at such parts of the coast as shall not have been already occupied, in order to trade with the natives, under the restrictions and conditions specified in the following articles.

Art. II. In order to prevent the right of navigating and fishing exercised upon the ocean by subjects of the high contracting parties from becoming the pretext for any illicit commerce, it is agreed that the subjects of His Britannic Majesty shall not land at any place where there may be a Russian establishment, without the permission of the governor or commandant; and, on the other hand, that Russian subjects shall not land, without permission, at any British establishment on the N.W. coast.

Art. III. The line of demarcation between the possessions of the high contracting parties upon the coast of the continent, and the islands of America to the N.W., shall be drawn in the manner following:—

Commencing from the southernmost point of the island, called Prince of Wales Island (which lies in the parallel of lat. $54^{\circ} 40'$ N., and between lon. 131° and 133° W., meridian of Greenwich), the said line shall extend to the North along the channel called Portland Canal, as far as the point of the continent where it strikes the latitude of 58° N. From this last-mentioned point the line of demarcation shall follow the summit of the mountains, situated parallel with the coast, as far as the point of intersection of lon. 141° W. (of the same meridian); and, finally, from the same point of intersection, the said meridian line of lon. 141° shall form the limit between the Russian and British possessions on the continent of America to the N.W.

Art. IV. With reference to the line of demarcation laid down in the preceding article, it is understood:—

1st. That the island called Prince of Wales Island shall belong wholly to Russia.

2nd. That whenever the summit of the mountains which extend in a direction parallel to the coast, from lat. 58° N. to the point of intersection of lon. 141° W., shall prove to be at the distance of more than 10 marine leagues from the ocean, the limit between the British possessions and the line of coast which is to belong to Russia, as above mentioned, shall be formed by a line parallel to the winding of the coast, and which shall never exceed the distance of 10 marine leagues therefore.

Art. V. It is moreover agreed that no establishment shall be formed by either of the two parties within the limits assigned by the two preceding articles to the possession of the

other ; consequently British subjects shall not form any establishment either upon the coast or upon the border of the continent comprised within the limits of the Russian possessions, or designated in the two preceding articles ; and in like manner no establishment shall be formed by Russian subjects beyond the said limits.

Art. VI. It is understood that the subjects of His Britannic Majesty, from whatever quarter they may arrive, either from the ocean or from the interior of the continent, shall for ever enjoy the right of navigating, freely and without any hindrance whatever, all the rivers and streams which, in their course to the Pacific Ocean, may cross the line of demarcation upon the line of coast described in Article III. of the present convention.

Art. VII. It is also understood, that for the space of ten years from the signature of the present convention, the vessels of the two powers, or those belonging to their respective subjects, shall mutually be at liberty to frequent, without any hindrance whatever, all the inland seas, the gulfs, havens, and creeks on the coast, mentioned in Article III., for the purposes of fishing and of trading with the natives.

Art. VIII. The port of Sitka, or Novo Archangelsk, shall be open to the commerce and vessels of British subjects for the space of ten years from the date of the exchange of the ratifications of the present convention. In the event of an extension of the term of ten years being granted to any other power, the like extension shall be granted also to Great Britain.

Art. IX. The above-mentioned liberty of commerce shall not apply to the trade in spirituous liquors, fire-arms, or other arms, gunpowder, or other warlike stores ; the high contracting parties reciprocally engaging not to permit the above-mentioned articles to be sold or delivered, in any manner whatever, to the natives of the country.

Art. X. Every British or Russian vessel navigating the Pacific Ocean, which may be compelled, by storms or by accident, to take shelter in the ports of the respective parties, shall be at liberty to refit therein, to provide itself with all necessary stores, and to put to sea again, without paying any other than port and lighthouse dues, which shall be the same as those paid by national vessels. In case, however, the master of such vessel should be under the necessity of disposing of a part of his merchandise, in order to defray his expenses, he shall conform himself to the regulations and tariffs of the place where he may have landed.

Art. XI. In every case of complaint on account of an infraction of the articles of the present convention, the civil and military authorities of the high contracting parties, without previously acting or taking any forcible measures, shall make an exact and circumstantial report of the matter to their respective court, who engage to settle the same in a friendly way, according to the principles of justice.

Art. XII. The present convention shall be ratified, and the ratifications shall be exchanged at London, within the space of six weeks, or sooner, if possible.

In witness whereof, the respective plenipotentiaries have signed the same, and have affixed thereto the seals of their arms.

Done at St. Petersburg, the 28th day of February, in the year of our Lord one thousand eight hundred and twenty-five.

(Signed)

STRATFORD CANNING.
The COUNT DE NESSELRODE.
PIERRE DE POLITICA. (L.S.)

IX.—FUR SEALS.

Some twenty or thirty years ago there was a most wasteful destruction of the fur seal, when young and old, male and female, were indiscriminately knocked on the head. This improvidence, as every one might have expected, proved detrimental in two ways. The race was almost extirpated ; and the market glutted to such a degree, at the rate, for some time,

of 200,000 skins a year, that the prices did not even pay the expenses of carriage. The Russians, however, have now adopted nearly the same plan which the Hudson's Bay Company pursues, in recruiting any of its exhausted districts, killing only a limited number of such males as have attained their full growth—a plan peculiarly applicable to the fur seal, inasmuch as its habits render the system of husbanding the stock as easy and certain as that of destroying it.

In the month of May, with something like the regularity of an almanac, the fur seals make their appearance at the Island of St. Paul, one of the Aleutian group. Each old male brings a herd of females under his protection, varying in number according to his size and strength: the weaker brethren are obliged to content themselves with half a dozen wives, while some of the sturdier and fiercer fellows preside over harems that are two hundred strong. From the date of their arrival in May, to that of their departure in October, the whole of them are principally on shore on the beach. The females go down to the sea once or twice a day, while the male, morning, noon, and night, watches his charge with the utmost jealousy, postponing the pleasures of eating and drinking and sleeping, to the duty of keeping his favourites together. If any young gallant venture by stealth to approach any senior chief's bevy of beauties, he generally atones for his imprudence with his life, being torn to pieces by the old fellow; and such of the fair ones as may have given the intruder any encouragement are pretty sure to catch it in the shape of some secondary punishment. The ladies are in the straw about a fortnight after they arrive at St. Paul's; about two or three weeks afterwards they lay the single foundation, being all that is necessary, of next year's proceedings; and the remainder of their sojourn they devote exclusively to the rearing of their young. At last the whole band departs, no one knows whither. The mode of capture is this:—At the proper time the whole are driven, like a flock of sheep, to the establishment, which is about a mile distant from the sea; and then the males of four years, with the exception of a few that are left to keep up the breed, are separated from the rest and killed. In the days of promiscuous massacre, such of the mothers as had lost their pups would ever and anon return to the establishment, absolutely harrowing up the sympathies of the wives and daughters of the hunters, unaccustomed as they were to such scenes, with their doleful lamentations.

The fur seal attains the age of fifteen or twenty years, but not more. The females do not bring forth their young till they are five years old. The hunters have frequently marked their ears each season; and many of the animals have been notched in this way ten times, but very few of them oftener.

Under the present system the fur seals are increasing rapidly in number. Previously to its introduction, the annual hunts had dwindled down to three or four thousand. They have now gradually got up to thrice that number; and they are likely soon to equal the full demand, not exceeding 30,000 skins, of the Russian market.—(Sir George Simpson).

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TUESDAY EVENING, MAY 26, 1898.

Islands, Rocks and Shoals between San Francisco, China and Japan.

Our Honolulu correspondent gives a list of islands, rocks and shoals between Honolulu, China and Japan, also between San Francisco and the Orient. This list has been carefully prepared by Capt. Daniel Smith, an old and intelligent shipmaster, who has resided on the islands for some time. He has also made up a list of rocks and shoals, which are laid down on charts as doubtful. These have been looked up and their positions sailed over, but no trace of them has been found. The list will undoubtedly be of importance to shipmasters sailing between this port and China, many of whom touch at the Sandwich Islands on the way thither.

LIST OF POSITIONS,

Which I have obtained from many sources, of a very dangerous part in the North Pacific, directly in the track of steam vessels bound to Japan and north coast of China, proceeding from this port:

Names.	Lat. N th	Lon. West.	Autho-ty.
Bird Island, 534 ft high. Neckar do, 280 "	23° 06'	161 57	
re-ent Frigate Shoals NE. extremity, W. SW.	23 35	164 39	Lieut. Brooke, USN.
Islet on the reef. Gardener Island and rocks—170 feet high. Maro Reef, (breakers extending six miles NNW. and SSE.)	23 44	66 04	Lieut. Brooke, USN.
Laysan Island, centre. Bank soundings 15, 17, 20 and 40 fathoms. Lisiansky, Johnston, or Maes's Island.	23 46	173 20	Lieut. Brooke, USN.
Bunker's or Philadelphia Island.	26 08	173 42	Capt. Paty & others.
Pearl and Hermes Reef, NE. point. N & S 50 miles, E & W 60 miles.	26 19	177 23	Capt. Brooke, Gambra P.M.C.'s depot, 1867. Doubtful, not yet certain.
Ocean, Curr. Staver's Island.	26 00	178 30	Various authorities, (mean.)
Delaware Rt. or Shoal. Johnston, Smith, or Cornwallis Island.	28 25	178 30	Very doubtful. Lt. Brooke, USN, by Capt's other (mean.)
Howland's Island.	16 45	169 39	Capt. Chisholm.
Baker's Island.	00 48	176 33	C. A. Williams.

Two Brothers (Islands)—very doubtful—I may safely say do not exist. Lieut. Brooke, *Fennimore Cooper*; Capt. Brooke, *Gambia*; Capt. Paty, *Mamookawad*.

POSITIONS COULD NOT BE FOUND.

Names.	Lat. North.	Lon. West.
Parappa Rock.	21° 30'	161° 18'
Maloon's Island.	19 20	165 21
Wilson Island.	19 22	166 50
Shoal.	18 28	170 30
Reef.	16 38	160 63
Shoal.	14 50	170 23
Shoal.	13 30	170 30
Island.	13 04	168 22
Island.	11 28	163 63
Paltron Island.	10 18	165 25
San Pedro Island.	11 10	179 02
Island.	8 20	170 00
Davis Island.	6 38	170 05
Island.	6 38	166 03
Barbera Island.	3 42	173 06
Reef.	3 55	174 32
Malcin Island.	2 57	172 45
Matthew Island.	2 07	178 26
Reef.	10 04	179 21
Harber Island.	9 00	178 00
Knox Island.	6 58	172 00
		Fast.
Reef.	23 48	164 00
Camira Island.	21 32	160 00
Shoal.	18 30	173 45
St. Bartholomew Island.	14 40	174 25
Decker Island.	22 22	162 50
Deserta.	20 10	165 20
Deserta.	23 12	160 50
Lamira Island.	10 10	164 09
Island.	20 28	166 54
Island.	18 57	163 30
Wake Reef.	17 50	173 45
Island.	16 02	171 38
Island.	17 10	176 52
Island.	16 02	176 26
Tarquin Island.	17 00	160 01
Reef.	17 15	159 17

POSITION OF ISLANDS ROCKS AND SHOALS—SOME OF THEM VERY IMPERFECTLY ASCERTAINED—FROM 180° GOING WESTWARD.

The Marshall, Gilbert and Caroline groups, and the Marianne or Ladrone Islands are not taken in yet—will form another list.

Forgotten last week—Krusenstern Rock, lat. 22 15 north, lon. 175 37 west. Authority, Admiral Krusenstern.

Names.	Lat. N th	Lon. East.	Authority.
Merrell Island or Bank.	39° 57'	174 31	(D'btful) Raper's Epl't.
Syer's Isld., Patocinio	28 09	175 48	" Raper.
Kleode-Oro.	29 51	157 04	" Raper.
Fatizi's Island, middle.	33 06	140 00	Raper.
South Island.	32 30	140 03	Krusenstern and Raper
Pouafidin Isld. or Rock	30 30	140 06	Lieut. Fonaifidin.
Bayunale-o do do.	32 01	140 06	Fr. frigate Bayunale
Smith Island or Rock.	31 18	139 50	H. M. S. Tribune.
Sal Rock or Lot's Wife	29 47	140 22	U. S. S. Maedonian.
alabruga Islands.	27 20	145 25	Raper (D'btful position)
Gampus Islands.	25 10	146 40	Raper do. do.
Volcano Islands—			
Sulphur.	24 48	141 30	Raper.
Reef.	24 48	141 24	Napoleon 3d, whaler.
San Alessandro.	25 14	141 18	Raper.
Dioneleo.	24 42	141 28	Raper.
Bonin Islands, extending N & S 42 miles:			
Pa-ry's Group, N. R. K.	37 46	142 07	Raper.
Kater Island, do.	37 31	142 12	Raper.
Peel Isld., S. W. Islet.	37 02	143 10	Raper.
Port Lloyd, Peel Isld.	37 06	142 11	Raper.
Salley Islands, 8 Islet.	28 30	142 13	Raper.
Ro-rio Island.	27 16	140 50	Raper.
Island Islet Island.	24 35	134 00	Raper.
Rosa Island.	24 28	134 40	Raper.
Berodine Isld's, N one.	26 02	131 15	Raper.
Parree Vella, Ball Rock	30 13	136 06	Capt. Douglass.
Barras Rock.	21 42	140 55	Capt. Barras, Mary Ann
Lindsay Rock.	19 20	141 20	Capt. Lindsay, Amelia.

Cornwallis, Smith, Sybilla or Gaspar Rico Reef, with Islets, south-southeast and north-northwest 20 miles. Northernmost clump of rocks 14 41 north, 168 50 east—Lieut. Brooke, U. S. N., Capt. T. Long and other.

Halcyon or Wake's Island or Reef, on which the *Libelle* was wrecked in 1866—entrance to lagoon boat passage, 19 19 north, 166 30 east. The island or reef is placed in lat. 19 11 north by the U. S. Exploring Expedition, but by Captains Wood, Cargill and Englab, who have visited the wreck, as above—19 19 north and 166 30 east.

Marous Island is marked doubtful on most of the charts, but Capt. Gillett, in the *Morning Star*, in 1864, passed near an island, in lat. 24 04 north, and lon. 154 02 east.

Marshall or Jardine Islands (2 small.) 21 40 north, 151 85 east. Some whalers affirm that they have landed on the rocks; others assert that they have sailed over this position without seeing anything.—Authority, ship *Scarborough*, 1788.

Names.	Lat. N th	Lon. East.	Authority.
Assumption Island, 2,000 ft high	19° 41'	145° 27'	Lieut. Raper.
Uraoas Rocks.	20 10	145 25	Lieut. Raper.
Farallon Island—Authority, Spanish corvette Narvaaz.	20 30	145 12	Lieut. Raper.
Guy Rock.	20 30	145 30	Lieut. Raper.
Grigan Island.	18 48	145 40	Lieut. Raper.
Pagon Island.	18 15	145 48	Lieut. Raper.

The three last positions are not well ascertained.

Yours, etc., DANIEL SMITH.

* By the late observations of the U. S. steamer *Lachar*, coming, just communicated, this reef is 42 miles in circumference. Latitude and longitude as above.

† I have not yet got sufficient data to determine positively on the above. In some log books I find "appearance of land" while in their vicinity—especially while near the position assigned to Bartholomew Island.

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